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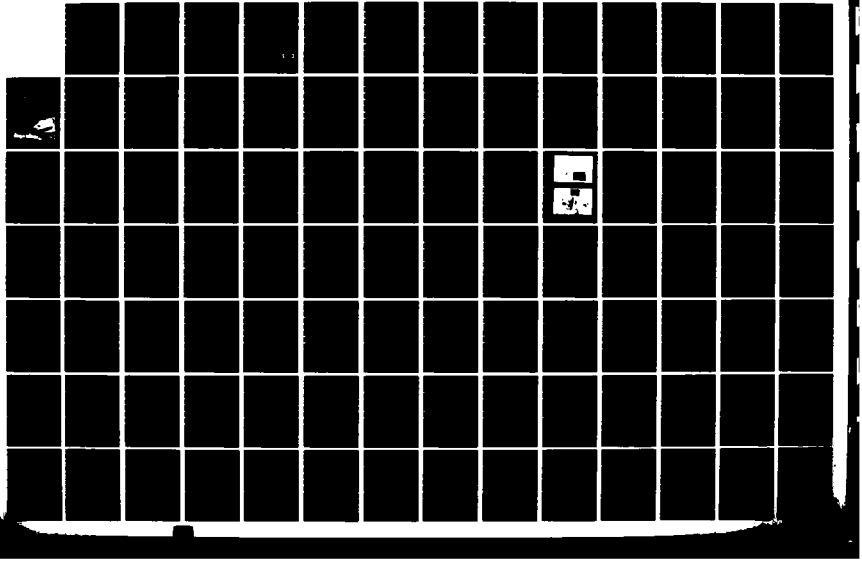

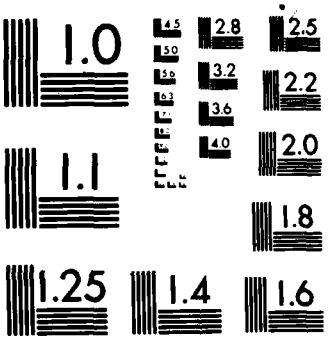

Phase II Testing at a Prehistoric Site (32BA418) At Lake Ashtabula (Sheyenne River) Barnes County, North Dakota

by

Richard A. Fox, Jr.
Department of Anthropology and Archaeology
University of North Dakota Archaeological Research
University of North Dakota
Grand Forks

July 1982

with contributions by

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Michael L. Gregg
and
John W. Wyckoff

Executed and prepared for the U.S. Army Corps of Engineers, St. Paul District, St. Paul, MN under the provisions of contract number DACW37-81-M-2670.

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32BA3 is located in the S½W¼ and N½W¼, Sec. 18, T141N, R58W, Barnes County, North Dakota. It lies in a cultivated field and wooded area on the floodplain along the left bank of the Sheyenne River, just below the Baldhill Dam. The site consists of a very low density scatter of cultural material with two surface artifact concentrations. It is evaluated as a prehistoric campsite with evidence for big game butchering, bone grease rendering, and hide processing activities. It is recommended that certain parts of the site not be impacted by earth moving equipment.

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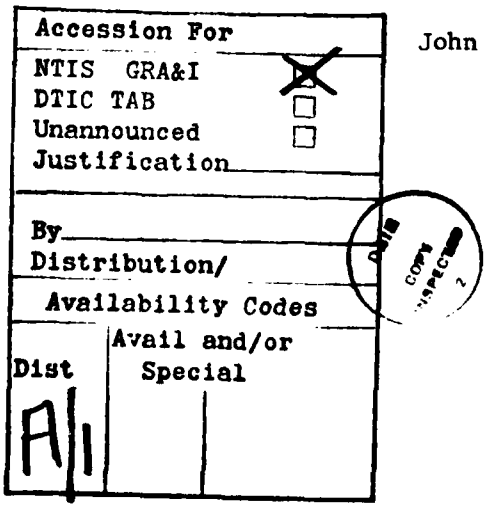

Executed and prepared for the U. S. Army Corps of Engineers, St. Paul District, St. Paul, MN under the provisions of contract number DACW37-81-M-2670.

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ABSTRACT

Site 32BA418 is located on the eastern margin of the Sheyenne River valley in Barnes County, North Dakota. Test excavations revealed that the site functioned as a bone processing area wherein bone was smashed to obtain marrow and prepare for bone grease rendering. Rendering was not accomplished in the tested site area; portions of the site where this activity may have occurred have probably been lost to lacustrine erosion. Geomorphological analysis suggests that the site was utilized from 1000 to 2000 years ago, probably during Middle or Late Woodland times. Cultural affiliation cannot be established because of the lack of diagnostic artifacts (e.g., ceramics) in the processed matrices. Geomorphological studies indicate that the solum has been disturbed by colluvial processes. Cultural stratigraphy, if once present, is not discernible. The site is evaluated as not significant in terms of National Register of Historic Places criteria.

MANAGEMENT SUMMARY

Phase II testing was conducted at 32BA418 under the auspices of U. S. Army Corps of Engineers, St. Paul District, Contract Number DACW37-81-M-2670. The testing was undertaken to allow the Corps to fulfill their general obligations regarding the disposition of cultural resources.

The scope of work (Cultural Resource Investigation at Lake Ashtabula) stipulated that Phase II testing would be undertaken at site 32BA418. If time and funding allowed, Phase II testing would also be undertaken at 32BA415. Unexpectedly deep and uniform cultural deposits at 32BA418 necessitated expending the time and monies allotted for the project at that site, thereby precluding investigations at 32BA415. This report deals only with field work at 32BA418, the location of which is shown in Figures 1 and 2.

The Scope of Work required an assessment of the archaeological materials in order to determine the presence/absence of cultural materials and/or features at the site, the integrity of the site, the vertical and horizontal distribution of cultural materials and if possible, the cultural affiliation. The Scope also called for recommendations on the significance of the site in terms of National Register of Historic Places criteria, including appropriate mitigative measures and time and cost estimates, if necessary. The resulting document was to serve several purposes; a) for use as a planning tool to aid the Corps in meeting its obligations to preserve and protect our cultural heritage, b) to serve as a comprehensive scholarly document, not only to fulfill mandated legal requirements but to serve as a scientific reference for future professional studies and c) to determine if the site has potential for public use development.

Testing was conducted at the site with two techniques, auger testing and 1 m^2 unit testing. The auger testing was conducted in the spring of 1979 by the University of North Dakota (under Contract Number DACW-37-78-C-0181). The 1 m^2 unit testing was conducted under the auspices of this contract (DACW-37-81-M-2670). The testing included the placement of five 1 m^2 units within the area of cultural distribution as suggested by the auger testing. Three matrix processing techniques were used including dry screening and/or wet screening through ¼ and 1/16 inch hardware mesh. Excavation was conducted in arbitrary 10 cm levels.

Laboratory processing was conducted in accordance with generally accepted methods in size grading, light fraction flotation and sorting of the light and heavy fractions into information categories. The information categories were then analyzed with specific reference to four hypotheses developed from the 1979 auger testing. It was hypothesized that the site functioned as a bison jump kill site, that only primary butchering occured at the site, latter stages of butchering took place at an area removed from the site and that much of the site had been lost to lacustrine erosion. Only the latter hypothesis was confirmed.

Testing and analysis revealed that the site was used as a bone processing area wherein bone was smashed to obtain marrow and in preparation for bone grease rendering. Geomorphological analysis

suggests that the activities occurred sometime from 1000 to 2000 years ago. The cultural affiliation of the site cannot be determined but the utilization probably occurred during Middle or Late Woodland times. Portions of the site where other activities may have occurred have probably been lost to lacustrine erosion from Lake Ashtabula. Geomorphological analyses indicate that the solum has been disturbed by aeolian/depositional processes. Cultural stratigraphy is not discernible. Cultural materials are distributed vertically from the upper levels of the subsurface (0 to 10 cm) to the contact between the solum and a Pleistocene clay till. The depths of this till are variable but do not exceed 74 cm in the areas tested. Auger and 1 m^2 unit testing indicate that the horizontal distribution of subsurface culcural materials are present at the site in disturbed context; artifact concentration features are present in relatively undisturbed context.

The site contains cultural materials with questionable integrity of locations, primarily because of the aeolian/depositional processes and bioturbation. The integrity of setting is questionable. First, the site area appears to be a remnant of a larger site. Secondly, fluvial and lacustrine erosion appears to have altered within-site microtopography. Integrity of association is poor. Only artifact concentrations are relatively undisturbed; perhaps 95% of the site area has been subjected to natural disturbances. Considerations of material, workmanship or design are either positive or not applicable. The site has yielded information important in prehistory but it is not likely to yield any significant amount of additional information. The site is evaluated as ineligible for listing on the National Register of Historic Places because it lacks integrity of location, integrity of setting and integrity of association. It is recommended that the Corps should eliminate 32BA418 from consideration for any future protection. The site does not have potential for public use development.

Study limitations were limited to hinderances of time and cost restraints. The repository of all records and artifacts is the Department of Anthropology and Archaeology, University of North Dakota, Grand Forks, North Dakota 58202.

INTRODUCTION

The Department of Anthropology and Archaeology, University of North Dakota (UND), Grand Forks, contracted with the U. S. Army Corps of Engineers, St. Paul District (Contract Number DACW37-81-M-2670) to conduct cultural resource test excavations at site 32BA418 and at site 32BA415. Both are prehistoric sites located on the shores of Lake Ashtabula, formerly the Sheyenne River, Barnes County, North Dakota. Site 32BA418 is located in Barnes County, North Dakota adjacent to the east shore of Lake Ashtabula (Figure 3), formerly the Sheyenne River. The legal location of the site is the NW¼, Section 25, Township 143 North, Range 58 East. The USGS 7.5' topographic quadrangle map reference is Sibley, North Dakota (1967). Figure 1 depicts the regional location of the site; Figure 2 depicts the topographic location.

Site 32BA418 was originally discovered in 1978 by a Department of Anthropology and Archaeology, University of North Dakota crew. The site was discovered in 1978 during survey operations conducted in accordance with Corps of Engineers, St. Paul District contract number DACW37-78-C-0181. This work was conducted during a split field season, the second portion of the project conducted in 1979.

Purpose of the Investigation

The purpose of the investigation at site 32BA418 was four-fold. First was the requirement to provide information sufficient to be used as a planning tool to aid the Corps in its obligations to preserve and protect the cultural resources. Second was the requirement to provide recommendations on the significance of the site according to the National Register of Historic Places criteria. Third was the desire to test the site to determine the existence of cultural materials and/or features, their condition (*in situ* or disturbed), the horizontal and vertical distribution of the remains and, if possible, the cultural affiliation of the site. Fourth was the desire to provide a scholarly, comprehensive document that not only serves as an aid for Corp management but as a scientific reference for future professional studies.

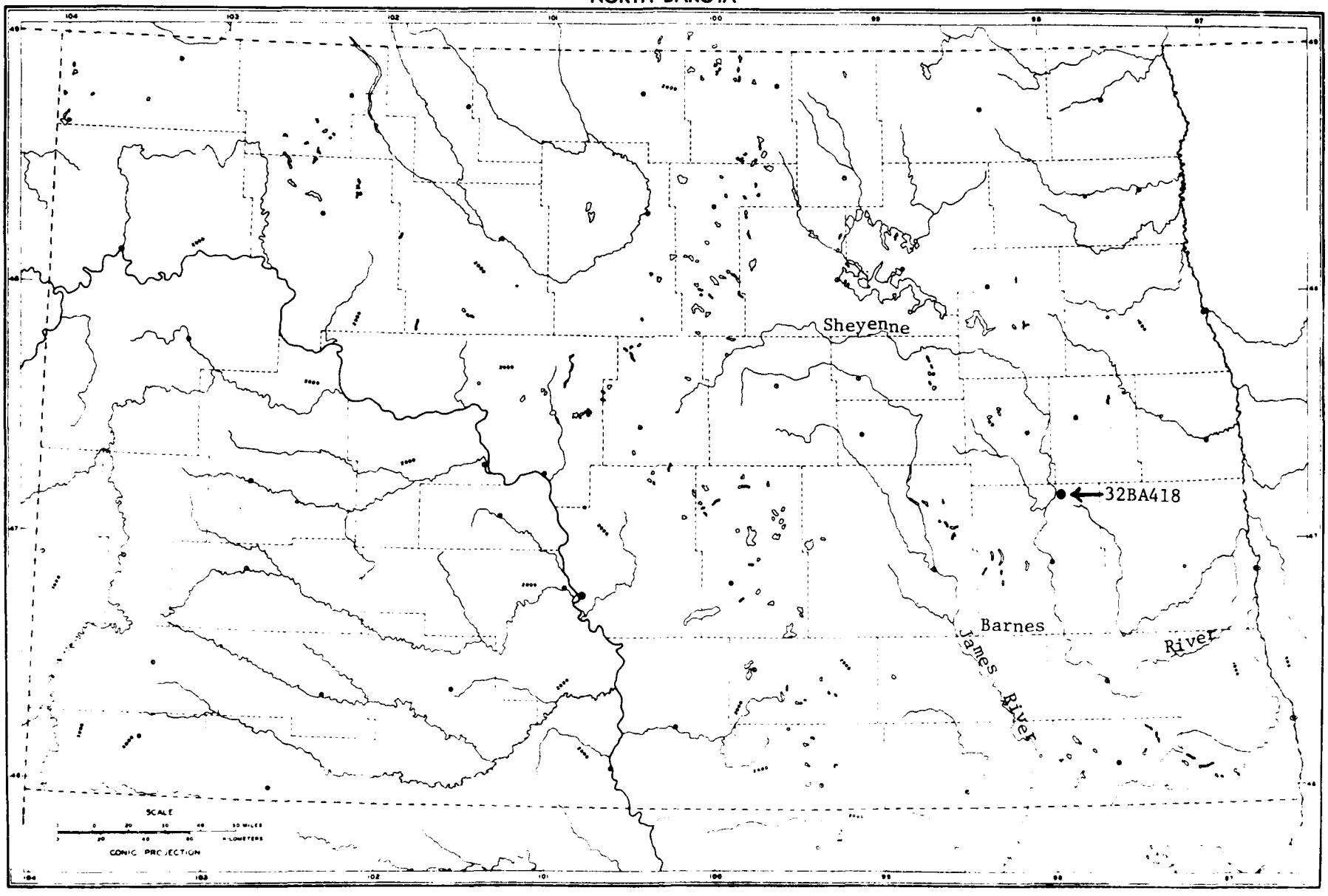


Figure 1. Location of 32BA418 within Barnes County, North Dakota.

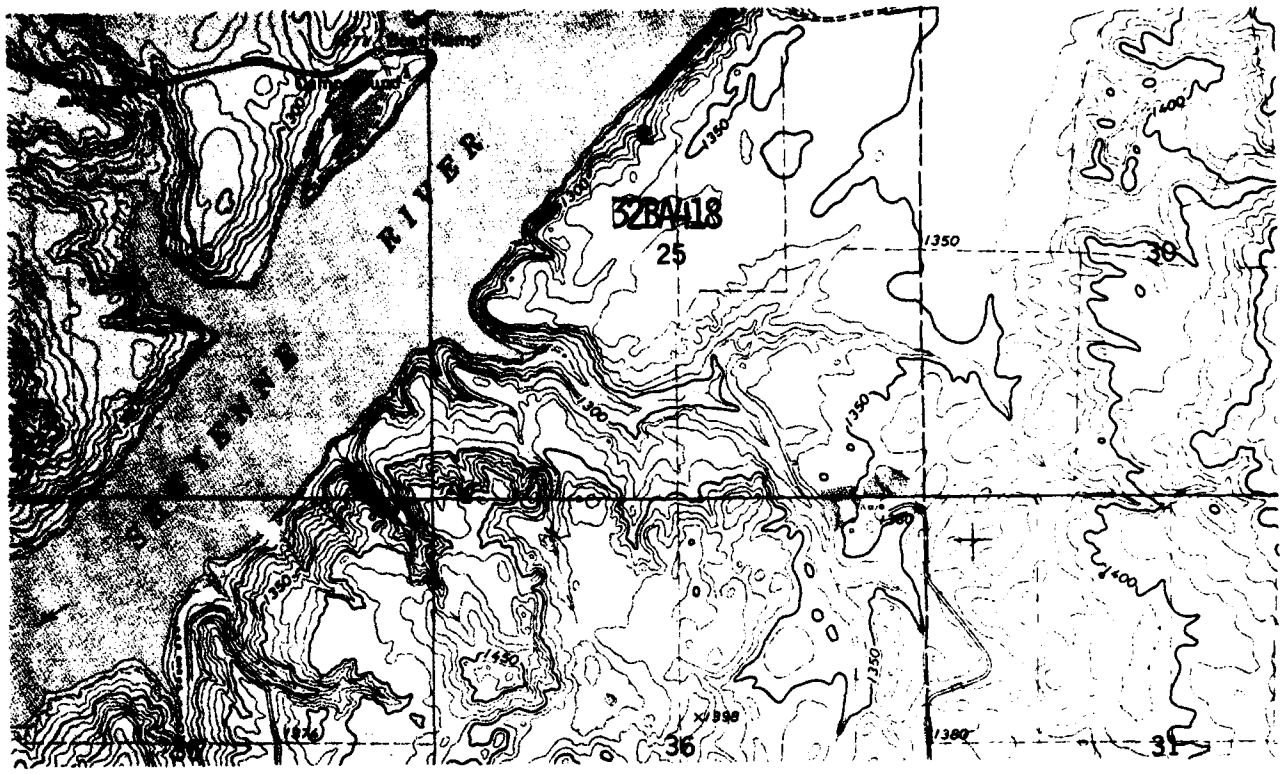


Figure 2. Location of 32BA418 adjacent to Lake Ashtabula. Map reference is U.S.G.S. Sibley 7.5' topographic quadrangle (1967).

Figure 3. Site overview of 32BA418. Lake Ashtabula is in the background; view is to the northeast.

Personnel and Schedule

The test excavations at 32BA418 were conducted between October 22 and November 3, 1981, specifically on October 22, 23, 24, 29, 30 and 31 and November 1 and 3. A total of 224 person-hours were expended on-site. Additional time was also spent in travel. The co-Principal Investigators were Richard A. Fox, Jr. (Associate Research Archeologist) and Michael L. Gregg (Research Archeologist). Assisting were UND Associate Research Archeologist Matthew J. Root, Advanced Archeological Assistants Virginia Gnabasik and Sarah Moore, and UND students Bob Christenson, Steve Getty, and Scott Gravum. Assistant Professor John Wyckoff, Department of Geography, UND, collected soils, geology, and natural history information at the site on November 3.

Laboratory analyses commenced in January, 1982 and continued through April on a periodic basis. Geomorphological analysis was conducted by John Wyckoff; faunal analysis was conducted by Virginia Gnabasik. Lithic analysis was conducted by Richard A. Fox. Others involved in analysis and preparation of the report included Michael L. Gregg, Sarah Moore, Bob Christenson, and Michelle Kirsch, all of UND. A total of 528.25 person-hours were spent on laboratory activities and report preparation.

Supporting Data

Records generated during the field and laboratory phases of this project remain on file at the Department of Anthropology and Archaeology, University of North Dakota, Grand Forks. These records include color slides and black and white prints, field maps, sketches, plates, original copies, site and testing forms and specimen collections. Other records include laboratory forms, a field report, and communications between the Corps and the University during the course of the project.

Literature and Records Search

Regional literature and records search work by UND is reported by the author (Fox 1980) and elsewhere (cf., Vehik 1978; Vehik and Vehik 1977). For this reason, it was deemed unnecessary to conduct an exhaustive literature and records search of previous investigations in the vicinity of the site. It was considered sufficient to outline the history of investigations at 32BA418. This outline is contained in The Site section of this report.

THE SITE

History of Investigations

Site 32BA418 was originally discovered in 1978 by a Department of Anthropology and Archaeology, University of North Dakota crew. The site was discovered in 1978 during survey operations conducted in accordance with Corps of Engineers, St. Paul District contract number DACW37-78-C-0181. This work was conducted during a split field season. On the basis of bone protruding from a cutbank, the site was revisited during the second portion of the project (1979) to conduct auger tests. The auger tests were conducted to determine the gross vertical distribution of the site as well as the horizontal distribution. On the basis of these tests it was determined that subsurface materials did exist and that the site was significant in terms of National Register of Historic Places (NR) criteria. If the site was eventually to be disturbed, the site was recommended for mitigation (Fox 1980a:87). See also the Auger Testing section.

Site Description

The site was situated on slightly sloping terrain between Lake Ashtabula and a steep valley wall that eventually grades into surrounding upland flats (Figure 3). The distance from the beach to the base of the valley wall is approximately 50 m. The elevation of the site extends from near 395 m at the edge of Lake Ashtabula to about 403 m MSL. The upland flats above begin at an elevation of 416 m MSL. The maximum and minimum dimensions of the site are 80 m and 35 m; the site is approximately 2000 m^2 in size.

Although the site area is slightly sloping, it is characteristically broken by several small flat areas. These flat areas are not unlike terraces but they are not interpreted as alluvial terraces. They are in fact, benches that may be due to slumping at the site. This phenomenon is explained more thoroughly in the Geomorphology section of this report. The steppe-like appearance represents only a small portion of the site area; the vast majority of the area is slightly to moderately sloping.

Small ephemeral drainages flank the site. These are heavily covered with brush. Much of the site area is also covered with deciduous brush. There are also a few deciduous trees within the site. The site area is heavily covered with grasses and forbs, primarily of the tallgrass community.

Prior to impoundment of Lake Ashtabula, the site was probably about 3 m above the river channel. It is not possible to estimate how close the river was to the site area during occupation, but it was probably near the site

rather than across the valley.

Testing Summary

Two types of testing have been conducted at the site (Figure 4). These are auger testing and 1 m^2 test units. Auger testing was conducted during the spring of 1979 under Corps contract DACW37-78-C-0181. A description of that testing is included in the Auger Testing section. The 1 m^2 unit testing was conducted in the fall of 1981 under Corps requisition purchase request number NCSED-ER-1070.

Five 1 m^2 test units were placed within the site. These were excavated to varying depths depending upon the location of a sterile subsurface clay stratum (Pleistocene glacial till). Various types of recovery processing techniques were used including wet and dry screening through ¼ and 1/16 inch hardware mesh. The 1 m^2 unit testing is described in detail in the Procedures section.

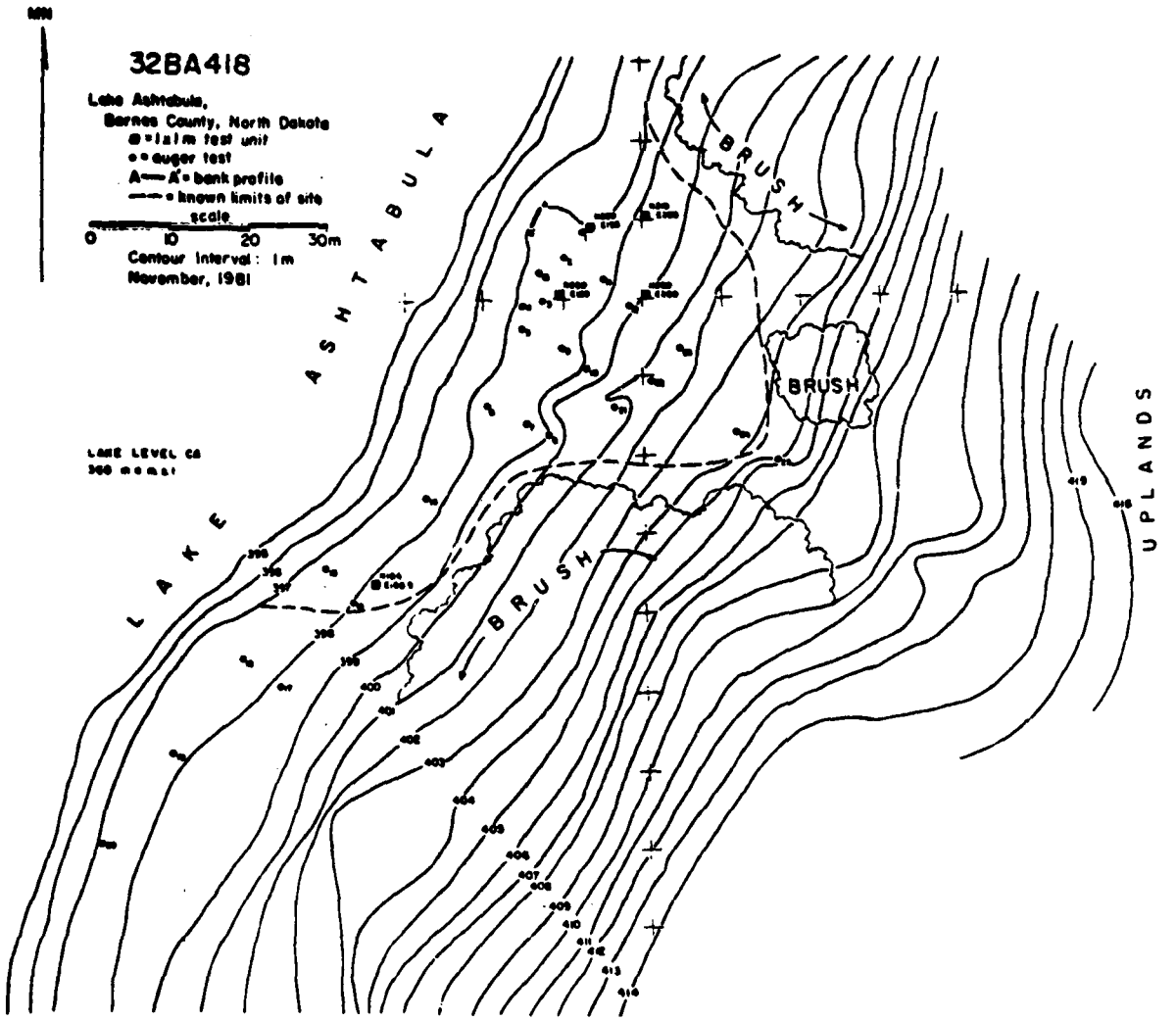


Figure 4. Contour map of 32BA418 showing locations of auger test units, 1 m^2 test units, cutbank profile (A-A') and grid system.

REGIONAL PHYSICAL SETTING

Geography and Geology

The site is located in the Drift Plains District of the Central Lowlands physiographic province (Figure 5). Nearly the entire area of the Drift Plains surrounding the site area is mantled with glacial drift. The uplands are covered with till and associated glaciofluvial deposits. Bedrock is exposed in the valleys of the Sheyenne River and Baldhill Creek. The floodplains of these streams are blanketed by alluvium (Kelly and Block 1967:5).

The dominant physiographic features are the elongated belts of end moraine and the deep valley occupied by the Sheyenne River. These features are separated by broad, undulating plains of ground moraine (Kelly and Block 1967:5). The upland topography is strongly rolling to nearly flat (Cooper 1947:2). In general, the land surface slopes toward the Sheyenne River (Kelly and Block 1967:5). Total relief does not exceed approximately 150 m.

A continental divide separating the Hudson Bay and Gulf of Mexico drainage systems crosses the western part of Barnes County (Kelly and Block 1967:5), yet the region lacks an integrated drainage system and is poorly drained. The drainage is mostly subsurface due to soil permeability and underlying deposits. Surficial drainage usually occurs in short, deep gullies that feed the Sheyenne River (Klausing 1968:7).

Presently the Sheyenne River valley is approximately 3.2 km wide and as much as 45.7 m deep at its upper extremes in the site area. The ancestral river channeled meltwaters from glaciers into various glacial lakes. The latest glacial lake to receive meltwaters from the Sheyenne was Lake Agassiz. The lake existed for sufficient time to allow the river to erode a narrow floodplain. When Lake Agassiz drained, the Sheyenne emptied into the Red River of the North and established the drainage as it exists today. Since the lake was drained, the river incised its channel (Kelly and Block 1967:47). This began after about 10,500 B.P. (Vehik 1978:6). Baldhill Creek was formed as an ice-marginal meltwater channel (Kelly and Block 1967:46).

Soils

The Sheyenne River valley contains the youngest sediments of the region. They were deposited during the Recent Epoch. The alluvium consists of fine grained silts and clays. Thin lenses of fine to coarse sand are also present. Lignite fragments are dispersed throughout the alluvium. Fossils are abundant. Gastropods are most common, but numerous small pelecypods are present (Kelly

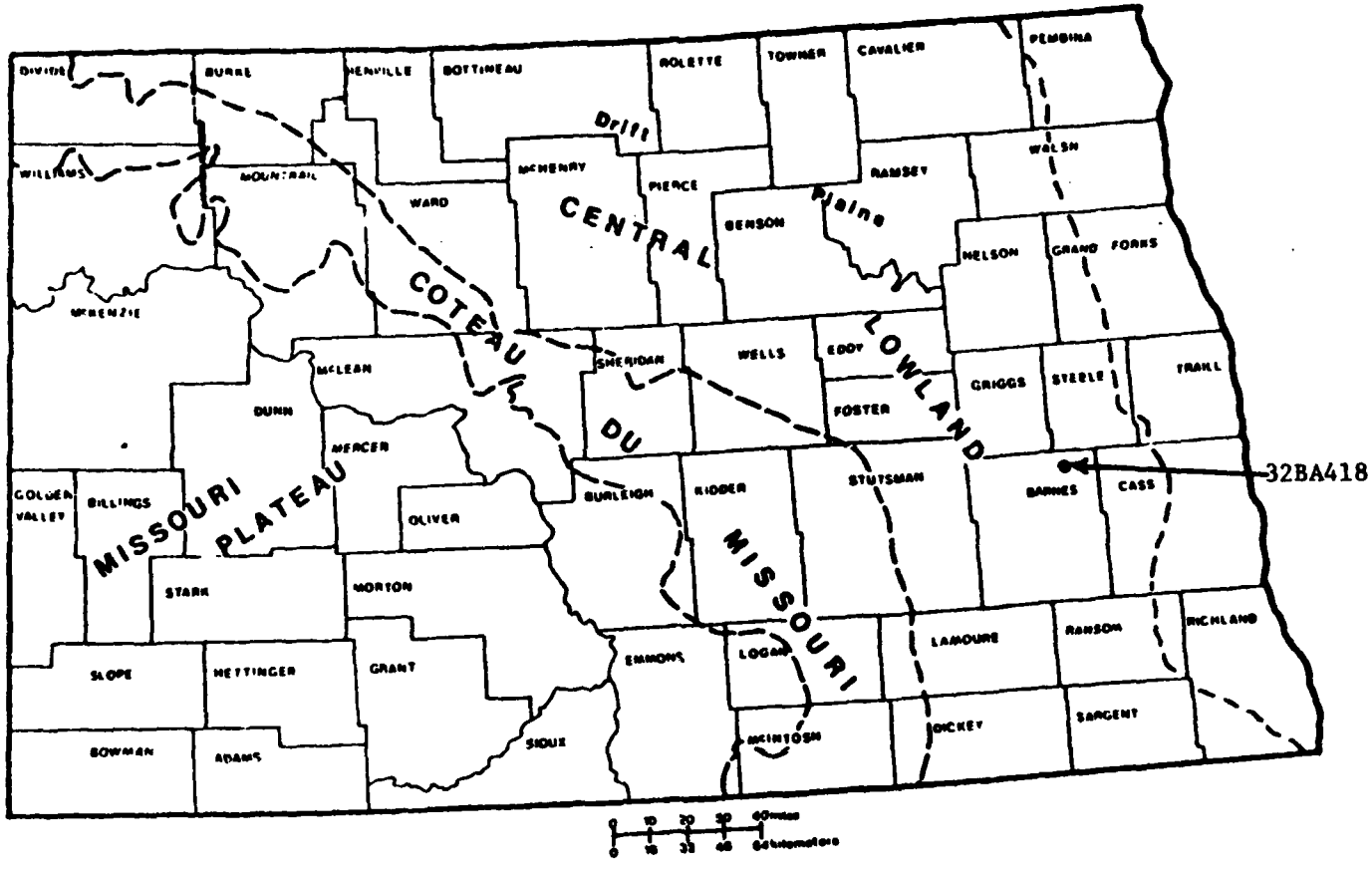


Figure 5. Physiographic subdivisions, North Dakota.

and Block 1967:41).

Alluvium was deposited in the Sheyenne Valley as valley fill and was subsequently dissected by the river. Consequently, the only landforms associated with the alluvial deposits are poorly developed terraces. The thickness of the alluvial deposits ranges from 0 to 15 m (Kelly and Block 1967:41-42). Soils are also discussed in the Geomorphology section.

Flora and Fauna

Prior to Euroamerican influxes, the transition grassland vegetation characterized the Drift Plains surrounding the site area (Figure 6). The chief dominants were the needlegrasses (Stipa spp.) and slender wheatgrass (Agropyion trachycaulum) (Anonymous 1979:7). Grasslands interspersed with the gallery forest occupied the Sheyenne River valley. Remnants of these communities exist today. The gallery forest species consist mainly of bur oak (Quercus macrocarpa), green ash (Fraxinus pennsylvanica), box-elder (Acer negundo), American elm (Ulmus americana) and others. These species were particularly prominent along the oxbows and meanders of the river (Johnson et al. 1974:20). Today, much of the vegetation is in cultivated crops, hay and pastureland.

Faunal types are varied throughout the region. Prior to non-native influences, species that are now absent such as moose (Alces americanus), antelope (Antilocapra americana), elk (Cervus canadensis), bear (Ursus spp.), deer (Odocoileus spp.) and bison (Bison bison) inhabited the area (Thompson and Joos 1975:86-90; Bailey 1926). Of these, only white-tail deer (Odocoileus virginianus) remain today (Johnson et al. 1974:38). Johnson et al. (1974:31-38) present in detail the numerous amphibians, reptiles, birds and small mammals that are frequently encountered within the region. According to Wiehe and Cassel (1977), there are 9 species of amphibians, 8 species of reptiles, 262 species of birds and 52 species of mammals that occur in the Sheyenne River valley.

Vehik (1978:10) has noted that many species of plants and animals that occur in the region were utilized by prehistoric inhabitants in other portions of eastern North Dakota and the Northern Plains. Excellent detailed accounts of such utilization can be found in Yanovsky (1936), Yarnell (1964), Densmore (1928), Gilmore (1911 and 1912) and Grinell (1923).

Climate

The present day climate of the region is classified as cool-temperate,

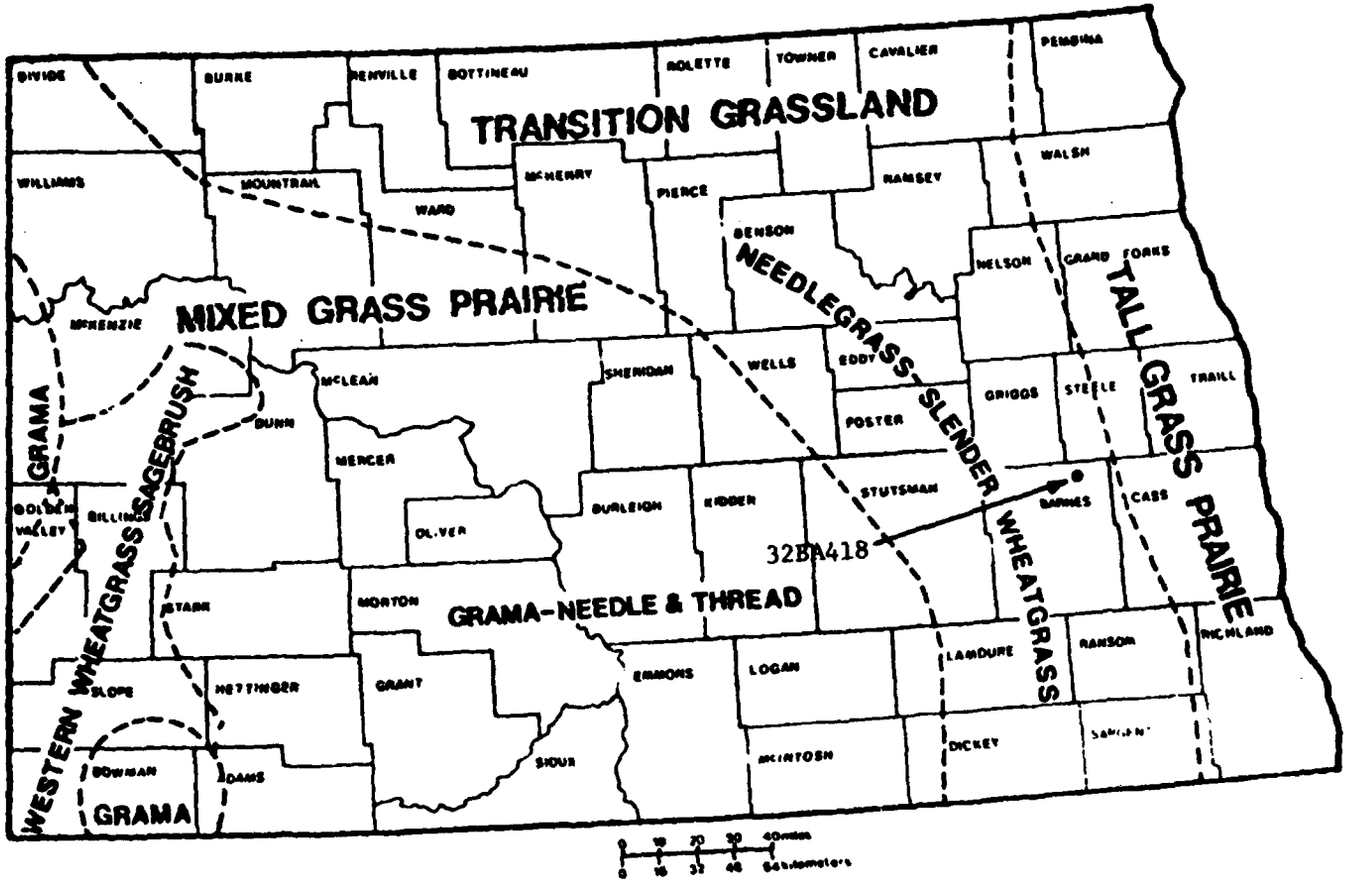


Figure 6. Vegetation zones, North Dakota.

dry and sub-humid with long winters and cool summers. The average annual precipitation is 45.9 cm. The mean annual temperature is 5.6° C.

Vehik (1978:7-8) has postulated a paleoenvironmental model derived from paleoecology studies conducted elsewhere on the northern Plains. The sequence is presented below.

The climate of eastern North Dakota between 12,000 to 10,000 B.P. was cool and moist with cool summers and warm winters (Bluemle 1977:53). This may have allowed the growth of boreal forests dominated by spruce-aspen, and is commonly referred to as the Late Glacial climatic episode (Wendland and Bryson 1974). At the end of the Pleistocene around 10,000 B.P. the climate became warmer and the black soils typical of prairie grasslands began to develop (Bluemle 1977:53). This period ended around 9000/8500 B.P., and was characterized by pine and/or deciduous forests (Vehik and Vehik 1977:10). Two climatic episodes, the pre-Boreal and Boreal are recognized during this period (Wendland and Bryson 1974:Table 7). The period between 8500 and 5000 B.P. to 4000 B.P. had an even drier and warmer climate which reached a maximum around 8000 to 7000 B.P. Dominant trees were oak, but prairie grasses replaced most woodlands. This is the Atlantic climatic episode (Wendland and Bryson 1974:Table 7), and is characterized by recurrent summer droughts, extensive soil erosion, wind caused dunes, and lowered lake levels (Bluemle 1977:53).

The climate became cool and moist again, similar to today's, around 5000 to 4000 B.P. and allowed the development of woodlands dominated by herbs, pine and deciduous trees. Basically, the climate fluctuated between cool humid conditons similar to the climate during most of the 1960s and slightly warmer periods like the 1930s (Bluemle 1977:53). Wendland and Bryson (1974: Table 7) recognize five climatic episodes: the sub-Boreal (5000 to 2700 B.P.), the sub-Atlantic (2700 to 1680 B.P.) during which cool, wet conditions prevailed with heavy winter snowfalls (Bluemle 1977:53), the Scandic episode (1680 to 1260 B.P.), the neo-Atlantic (1260 to 850 B.P.), and the Pacific episode between 850 to 400 B.P. (Vehik and Vehik 1977:10-11).

The final climatic episode, the neo-Boreal (400 to 100 B.P.), was not discussed by Wendland and Bryson. However, other researchers have noted colder and wetter climatic conditions with one period of alpine glaciation. Since A.D. 1850 alpine glaciation declined as the climate became warmer and somewhat less wet (Vehik and Vehik 1977:11).

CULTURAL CHRONOLOGY OVERVIEW

There are several archaeological spatial divisions (subareas) that delimit the Great Plains of the United States and Canada. Of these, the site area lies within the division known as the Northeastern Plains. The site area is peripheral to the Middle Missouri subarea to the west and the Central Plains to the south (Figure 7).

The prehistory of the region is poorly known. This is due, in large part, to the area's near total lack of modern, rigorous investigations. It is possible, however, to adapt culture history syntheses formulated from data found elsewhere on the Great Plains to the three subareas. Within these subareas, the prehistoric cultural milieu is divided into major categories called cultural periods. They are: Paleo-Indian (ca. 10,000 to 4000 B.C.), Plains Archaic (4000 to 500 B.C.), Plains Woodland (500 B.C. to A.D. 900) and Plains Village (A.D. 900 to 1750).

For the first 9.5 millennia, the paleo-Indian and Plains Archaic ways of life persisted on the Central Plains, Northeastern Plains and Middle Missouri subareas. By 500 B.C., patterns of limited horticultural subsistence practices coupled with a number of cultural traits began moving from the east into the Middle Missouri subarea. These archeological cultures derived from, and were closely related to, the Woodland cultures that exploited the woodland environs of the eastern United States. The forested riverine environments of the plains closely approximated the woodland areas in which these lifeways/adaptations originated. By the beginning of the Christian era the Plains Woodland tradition was probably well established in the Dakotas (Lehmer 1971:31). Finally, circa A.D. 900, the Plains Village cultures began to appear in the Middle Missouri subarea. Like the preceding Plains Woodland tradition, the Plains Villager tradition derived from the east (Lehmer 1971:32). The Plains Village tradition adaptation exploited the Northeastern Plains east of the Missouri, including the study area, but as of yet there is no such evidence in the Sheyenne Valley.

Paleo-Indian Period

This period is characterized by a variety of lanceolate-shaped projectile points, including Clovis, Folsom, and a variety of Plano types. The subsistence emphasis was on hunting of large game animals (mammoth and extinct forms of

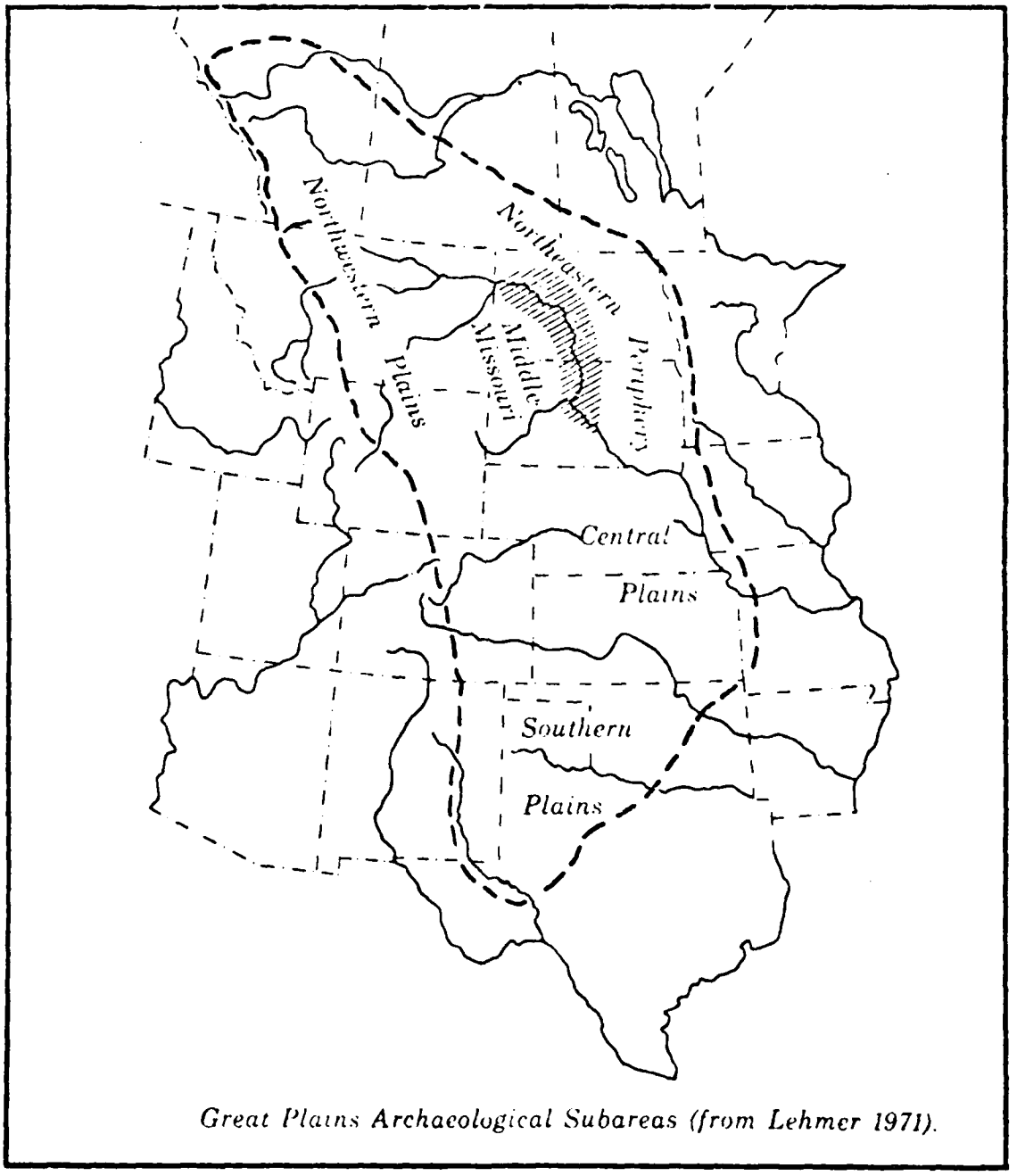


Figure 7. Great Plains archaeological subareas. The Northeastern Periphery is referred to as the Northeastern Plains in this report.

bison) with a lesser dependence on vegetal and small game resources. Independent, small bands formed the basic social structure. Known paleo-Indian components exist west and south of the site area in the Middle Missouri subarea. These include the Moe site (Schneider 1975) in North Dakota (on the Missouri River 32 km south of the survey area) and several sites in South Dakota (Ahler, Goulding and Weston 1979:5). Vehik (1978:17) reports that isolated finds of Folsom-like projectile points are common north and west of the survey area along the upper Sheyenne and James rivers.

Plains Archaic

A decline in big game dependence with a shift toward reliance on small game and vegetal foodstuffs is evident during this period. Social units probably remained small but with a growing interaction between them. There appears to have been a variety of implements made of wood, stone, bone and plant fibers. Early in this period stemmed projectile points were common; later, corner notch specimens were used. The Plains Archaic period is well documented on the Northeastern Plains at the Long Creek site (Wettlaufer & Mayer-Oakes 1960). This site, near Estevan, Saskatchewan contained elements of the Archaic Long Creek (ca. 3000 b.C.), Oxbow (ca. 2700 to 1850 B.C.) and Hanna (ca. 1400 B.C.) "cultures." Other nearby Plains Archaic components exist at the Moe, Mortlach (Wettlaufer 1955) and Oxbow sites (Nero and McCorquodale 1958) in southern Saskatchewan.

Vehik (1978:18) and Reeves (1973:1243) have noted that well defined Plains Archaic sites are lacking along river terraces and sediments. They conclude that this is a result of a lack of intensive investigations and, in particular, of the probability that these sites are deeply buried by alluvium. It is probable that the same holds true for paleo-Indian sites. Certainly, the lack of sites from either of these periods in the site area ought to be considered a result of these conditions until demonstrated otherwise.

Plains Woodland

The following discussion has been derived from Vehik (1978) with modification. The Woodland period, characterized by the presence of pottery and burial mounds, appears to follow the Archaic period. These cultures appear around the beginning of the Christian era. For the most part the Woodland occupation of the northern Plains, and particularly the region, is poorly defined.

The Woodland Period has been apportioned into three stages that include Early Woodland, Middle Woodland, and Late Woodland. There is little evidence for Early Woodland occupations in the northern Plains (Syms 1977:129). One possible site is Morrison Mound 13 in western Minnesota with a radiocarbon date of 2640 B.P. (Wilford et al. 1969:24-25,50).

Data becomes more frequent in the Northeastern Plains with Middle Woodland occupations. The groups occupying central and eastern North Dakota and adjacent regions were of two general types, Sonota and Laurel. Laurel components have just recently been recognized in the adjacent James River valley (Schneider 1982) and certain Minnesota Laurel sites contain high frequencies of Knife River flint derived from western North Dakota. Laurel adaptations in the study area are almost totally unknown.

The Sonota complex, as defined by Neuman (1975:96), is one complex characteristic of Middle Woodland cultures from the Northeastern Plains. The Sonota complex was defined on the basis of a series of campsites and mounds found in the Dakotas from the Missouri River trench eastward to western Minnesota (Neuman 1975:96). The site area is included in this region.

Sonota complex ceramics are not particularly abundant. Neuman(1975:93) recognized two gross classes, vessels with a cord roughened surface finish and plain vessels. These are usually grit and sand tempered from local materials. Some of the ceramic attributes (and tumuli) are thought to represent Hopewellian (eastern Woodland) influences.

Middle Woodland burial mounds are characteristically circular domed structures. The tumuli generally have a central, subfloor burial chamber with associated mortuary objects. Secondary interment was the most common burial mode (Neuman 1975:95-96).

Large corner-notched, side-notched and expanded stem specimens seem to be characteristic of the Middle Woodland projectile point industry. Small side-notched and unnotched triangular specimens tend to occur later in time, probably during Late Woodland times.

Sites near the site area which may belong to the Sonota complex are few. Site 32BA1 has already been included in the complex by Neuman (1975:79). Also Strong's (1940:385) Lisbon mound may belong to the Sonota complex or one of the southern Minnesota groups. Several of the mounds at 32BA410 exhibit evidence of a subfloor burial chamber.

Named Late Woodland archaeological units with components known or anticipated in extreme eastern North Dakota are defined with reference to cultural sites and materials from the Red River Valley and eastward in Minnesota. These include the Arvilla complex, Blackduck, the Kathio focus and the Wanikan culture.

Beginning around 1400 B.P., the Late Woodland Arvilla complex appeared in the Northeastern Plains. It has been suggested the Arvilla was basically a mortuary complex associated with a series of foci or phases (Johnson 1973:65). Since no habitation sites have been associated with this complex little can be said regarding settlement and subsistence patterns. Basically, all that can be said is that burials tended to be placed under both round and linear mounds with a burial assemblage reflecting northern origins with the addition of some marine shell trade goods from the south (Johnson 1973:66).

Within the Red River valley and northern Minnesota Blackduck may have developed from an Arvilla complex base (Johnson 1973:66). In central Minnesota, however, the Kathio focus, which developed from the Malmo focus, replaced Arvilla (Johnson 1973:66).

The presence of Blackduck in the southern Red River valley is not adequately documented. Nelson (1973:76) noted that such material was recovered from southeastern Sargent County, North Dakota by the University of Minnesota expedition but little other data is available. However, in southern Canada Blackduck may have continued to historic times, and has been suggested to be prehistoric Assiniboine (Hlady 1970:108-110).

The Kathio focus dates from at least 1400 to 1000 B.P. (Wilford 1970: vii-viii and Wilford et al. 1969:51). The Kathio focus people practiced secondary burials in mounds which were sometimes accretional and they added very few, if any, grave goods (Johnson 1973:66 and Wilford et al. 1969:15). These people, as well as those of the Blackduck, were primarily hunters and gatherers. Although no sites belonging to the Kathio focus have been noted in the site area it is possible that 32GG1 could belong here rather than to Laurel.

Another Late Woodland complex in northern Minnesota is characterized by Sandy Lake pottery (Cooper and Johnson 1964). Sites associated with Sandy Lake ceramics are included in the Wanikan culture (Birk 1977:31). Overall, it is one of the most recent Late Woodland cultures in Minnesota and is dated between 950 and 250 B.P. (Birk 1977:31). Essentially, it is characterized by cord-roughened, shell-tempered Sandy Lake pottery, small triangular projectile points, fire hearths and pits, prepared ricing jigs or threshing pits, intrusive mound burials, exclusive circular conical mounds with shallow burial pits, primary flexed inhumations, seasonally occupied sites, and the inferred use of

wild rice (Birk 1977:32).

Plains Village

People of the Plains Village period exploited heavily the Middle Missouri subarea. Subsistence consisted of the cultivation of maize, beans and squash in the Missouri bottoms and bison hunting on the upland grasslands (Ahler, Goulding and Weston 1979:5). Plains Villagers, as the name implies, lived in earthlodge villages chiefly along the Missouri. They manufactured pottery and made tools from bone and stone. After protohistoric times the villagers were important middlemen in the lucrative Euroamerican trade networks. Eventually, the pressure of Euroamerican expansion destroyed the traditional village cultures.

The extent of Plains Village influences on the Northeastern Plains near the site area is poorly known. Good et al. (1977) excavated a Plains Village site (32SN403) on the lower James River not far from the site area. Beisterfeldt, or the Sheyenne-Cheyenne site (Wood 1971) downstream on the Sheyenne is a Plains Village tradition site associated with the protohistoric Cheyenne Indians.

In summary, the chronology of the Northeastern Plains surrounding the site area is poorly known. The scant data now available suggest that this region may have been exploited as early as paleo-Indian times. Certainly the Plains Archaic evidence at the Long Creek site supports the assumption that the Archaic peoples utilized this part of the Northeastern Plains subarea but the deposits are probably deeply buried. The same is true for the cultures of the Plains Woodland period. Less certain is the nature of Plains Village period cultural influences surrounding the site area.

AUGER TESTING

The auger testing was conducted in the spring of 1979 under the requirements of Corps contract number DACW37-78-C-0181. The testing was conducted because bone was noticed eroding from a cutbank above the shoreline. The in situ bone seemed to be distributed from near the surface to a depth of approximately 30 cm. This area is depicted in Figure 4 as A - A'.

The purpose of the testing was to determine the horizontal and vertical limits of the site and the nature of the content, if possible. A total of 25 auger tests were placed at the site (Figure 4) beginning near and above the material in the cutbank. The depth of the units ranged from 25 to 75 cm. In nearly all instances, the units were discontinued at the top of an impenetrable clay stratum. All of the unit matrices were processed through a 6.35 mm hardware mesh in order to recover any cultural materials present. Ten flakes (two of Knife River flint, one of chalcedony and seven of Swan River chert) and numerous bone fragments were recovered. Table 1 itemizes the materials found on the surface during the 1978 investigations; Table 2 lists the materials found in the auger test units during the 1979 investigations. Table 3 lists the pertinent information per auger test unit.

Generally, the bone was discovered in many of the walls of the test units at depths ranging from 5 to 43 cm. The bone was identified as that of Bison bison. The maximum depth of the clay stratum in any of the test units was 75 cm. The testing suggested that the cultural material was distributed to a depth of at least 43 cm and possibly to the top of the clay (Fox 1980a:86).

On the basis of the artifactual and bone evidence, several hypotheses were advanced:

1) the precipice above the site served as a convenient bison jump area and that the remains at the site were the result of butchering bison;
2) on the basis of faunal elements at the site, only primary butchering activities were carried out;
3) latter stages of butchering were carried out within a different area of the site or at some distance removed from the site;
4) much of the site where other activities related to these hypotheses have been inundated or destroyed by Lake Ashtabula.

Table 1. Surface collection, 32BA418.

CHIPPED STONE Material		KRF	Swan River Chert	Basalt	Chert	Chal-cedony	Quart-zite	Other
PATTERNED	projectile points							
	scrapers							
	bifaces				1			
UNPATTERNED	bifacially worked fragments							
	flake tools							
	nonbipolar cores							
	bipolar cores							
	waste flakes	1						
	tested raw material							
	untested raw material							

CERAMICS (present__ absent_x)	Plain	Cord Roughened	Brushed	Incised	Simple Stamped	Check Stamped	Other
rim sherd							
body sherd							

FAUNAL REMAINS	unidentifiable remains:
present__x	identifiable remains: two, left, distal humeri, probably Bison, + total of 700 g of other identifiable bone, all probably Bison.
absent___	

OTHER	

Table 2. Subsurface Collection, Auger Test Operations, 32BA418.

CHIPPED STONE — Material	KRF	Swan River Chert	Basalt	Chert	Chalcedony	Quartzite	Other
PATTERNED: projectile points							
PATTERNED: scrapers							
PATTERNED: bifaces							
UNPATTERNED: bifacially worked fragments							
UNPATTERNED: flake tools							
UNPATTERNED: nonbipolar cores							
UNPATTERNED: bipolar cores							
UNPATTERNED: waste flakes	2	7			1		
UNPATTERNED: tested raw material							
UNPATTERNED: untested raw material							

CERAMICS (present__ absent x)	Plain	Cord Roughened	Brushed	Incised	Simple Stamped	Check Stamped	Other
rim sherd							
body sherd							

FAUNAL REMAINS present x absent___	unidentifiable remains: numerous unidentifiable bone fragments identifiable remains: 2 metacarpal (?) fragments, fused central and 4th tarsal, fibular tarsal, fused tarsal fragment (central and 4th ?), numerous rib fragments, 3 tooth fragments, all of Bison bison. 1537 grams of bone, total.
OTHER	1 pelecypod specimen (paleontological)

It was also suggested that the paucity of lithic artifacts at the site may be due to the hypothesized nature of the site, the testing inadequacies of auger testing or the location of other, destroyed portions of the site.

Following is a summary of the data recovered from the auger test units as well as the distribution of cultural material within the units. The locations of the auger test units are included in Figure 4.

Table 3. Pertinent information per auger unit.

Auger test	Depth (cm)	Material	Comments
1	52	sterile	screened
2	43	flakes and bone, bone *in situ* at 36 cm	stopped at clay
3	75	pelecypod, bone observed at 20-30 cm.	stopped at clay
4	45	sterile	screened, stopped at clay
5	28	2 bone fragments, bone *in situ* at 5 cm	screened, stopped at clay
6	35	possible flake and bone fragments	screened, stopped at clay
7	50	bone, bone *in situ* at 38-43 cm	screened
8	25	sterile	screened, stopped at clay
9	51	1 bone fragment	screened, stopped at clay
10	50	occassional bone, possible flakes	screened, stopped at clay
11	34	flakes, several bone fragments	screened, stopped at clay
12	45	1 bone fragment	stopped at clay
13	28	bone	screened, stopped on top of large rock
14	35	sterile	screened, stopped on top of large rock
15	36	sterile	screened, stopped by large roots
16	68	2 flakes KRF	screened, stopped at clay
17	50	sterile	screened, stopped at clay
18	65	sterile	screened, stopped at clay
19	49	sterile	screened, stopped at clay
20	38	sterile	screened, stopped at clay
21	33	sterile	- - - -
22	41	numerous bone fragments, bone *in situ* from 24-28 cm	- - - -
23	21	- - - -	- - - -
24	51	1 bone fragment	- - - -
25	52	sterile	screened, stopped at clay

Site Mapping

The site was mapped (Figure 4) by contour and a grid established using a David White model TR-300 transit and metric rod. Initially, north-south and east-west base lines were established with both bisecting near the center of the site. The bisection point was assigned an arbitrary grid reference of 200 meters north, 200 meters east (N200E200). This procedure was used to allow testing in one quadrant only, thereby minimizing cataloging confusion and to allow for expansion of the site's limits, if necessary, within the same quadrant. Grid point reference N200E200 is the semi-permanent datum from which the grid system can be reestablished if necessary.

After establishing the grid, elevations were taken from known reference points and the numerical angular and bearing information recorded. From this information, an accurate contour map of the site was constructed. Contour elevation lines were established according to a mean sea level (MSL) reference based upon the reservoir pool at the time of mapping (the pool elevation was tied into the contour information). Following this procedure, the auger test units drilled in 1979 were relocated and their position within the grid system recorded. The location of test units and the A - A' profile was mapped.

Testing Procedures

All excavation units were one meter square. A total of five test units were excavated. These include N210E200, N209E193, N200E200, N200E189 and N164E166.5. Each unit was excavated in arbitrary 10 cm levels. Standard general level excavation forms were completed for each level. Black and white print and color slide photographs were taken of artifact concentrations. Upon completion of a test unit, stratigraphic profiles of selected unit walls were drawn. Plan drawings were also completed for each excavation unit that exhibited possible traces of cultural activity in the floor. A total of 3.24 m^3 of site matrix was excavated.

The location of the test units corresponded to the general distribution of cultural materials as indicated by the 1979 auger testing results. Two units (N200E200 and N210E200) were placed on the upper bench and two on the lower bench (N200E189 and N209E193) (Figure 4). The fifth unit (N164E166.5) was placed on the lower bench to the south.

During the testing operations we also profiled and recorded the stratigraphy of a lacustrine exposed cutbank near and above the reservoir shoreline. It was here that we originally discovered the site in 1978 on the basis of bone elements eroding from the cutbank. The profile was 2.6 m long and extended to a greatest depth of 46 cm, terminating at a culturally sterile clay substratum that is present, as indicated by the test and auger results, throughout the site at varying depths.

Data Recovery Procedures

Data recovery procedures varied at the site. Three procedures were used. General level matrices (10 cm levels) were either (1) dry screened through ¼ inch mesh hardware cloth, (2) water screened through ¼ inch mesh hardware cloth, or (3) water screened through 1/16 inch mesh hardware cloth. The Scope called for ¼ inch screening, but the finer scale recovery technique was implemented to maximize information recovery in several units. At unit N164E166.5, the matrix up to 50 cm deep was processed through a ¼ inch water screen. At that point it appeared that the cultural material was becoming more frequent (and of a size that would pass through the ¼ inch screen) so the remaining two levels (50 cm to 70 cm) were processed through 1/16 inch water screens. At unit N200E200, the first three levels (to 30 cm) were processed through a ¼ inch water screen, the last three (30 cm to 60 cm) through a 1/16 inch water screen. Units N200E189 and N209E193 were processed completely by 1/16 inch water screening. At unit N210E200, all five levels were processed using a ¼ inch dry screen. Thus, 1.94 cm^3 of site matrix were processed through 1/16 inch wet screens, 0.8 m^3 through ¼ inch wet screens, and 0.5 m^3 through ¼ inch dry screens.

Ten centimeter levels were removed from the test excavation units, processed, dried when possible, bagged, and cataloged as discrete units. Four artifact concentrations (Figures 7 and 8) were encountered, three in unit N209E193 and one in unit N200E189. These concentrations include bone and what appears to be hammer or anvil stones used to crush the bone. These concentrations (AC 1, unit N200E189; AC 1, AC 2 and AC 3, unit N209E193) were treated as features and excavated, processed, sorted, and analyzed as discrete units.

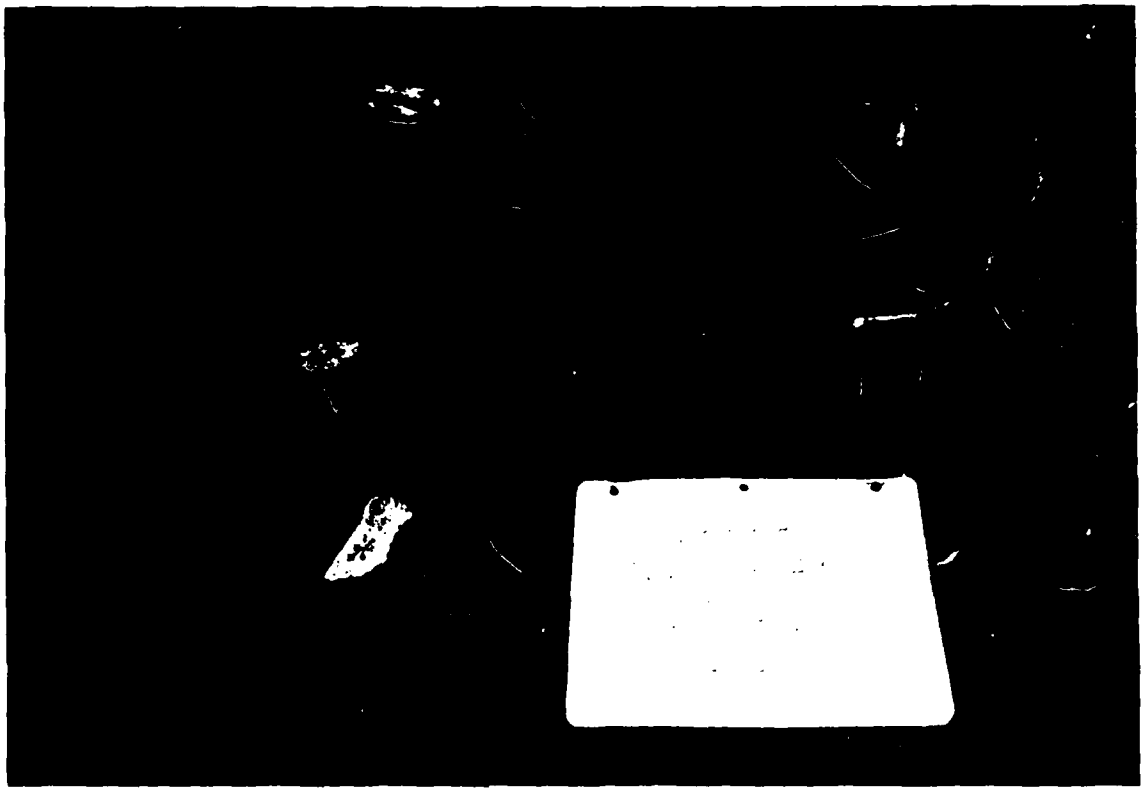


Figure 8. Artifact concentration #1, unit N200E189, plan view.

Figure 9. Artifact concentration #2, unit N209E193, view of south wall.

Two liter soil samples were taken from each level at each test unit beginning with level 3. Samples were not taken from the first two levels because of heavy bioturbation. The samples were taken from the southwest corner of each level. The soil samples were used to extract land snails for environmental reconstruction.

Laboratory Procedures

The first step in the laboratory process began by size grading all waterscreened materials. Size grading was executed by using an automatic aggregate shaker which separated the materials into five size grades. It is considered that size grading is a useful tool for three reasons: first, it segregated archeological remains into similar size categories which facilitates the process of sorting by material class. Second, it draws arbitrary, but uniform, size cut-off points for the sorting and investigation of particular material classes. Third, it provides a mechanism for quantification of fracture.

The automatic aggregate shaker has nested square-mesh wire screens of various size openings. The following 5 size grades are utilized in the automatic aggregate shaker.

G1. Grade 1 = 25.00 mm (1.000 in) opening
G2. Grade 2 = 12.50 mm (0.500 in) opening
G3. Grade 3 = 5.60 mm (0.223 in) opening
G4. Grade 4 = 2.80 mm (0.111 in) opening
G5. Grade 5 = 1.18 mm (0.0469 in) opening
<G5. Smaller than Grade 5 materials passing through 1.18 mm opening

Through a series of experiments, a 30-second duration was determined to be the optimal length of time for one batch of waterscreened debris in order to complete size grading with minimum damage to the artifacts.

Following size grading, the next step in the lab process was water flotation. This technique was applied to materials in G4 and G5 in order to separate the light fraction from all other remains. Materials passing through the G3 screen were placed in a 1.07 mm (0.0429 in) opening screen bottomed pail and then dipped in a larger tub of water. Through a combination of both dipping and agitation, lighter materials were floated or suspended in the water and were removed for drying by a small hand dipper screen. The heavy materials remaining in the pail were then placed on screening for drying. When completely dry, light and heavy fractions were bagged separately for the next process, sorting.

Sorting

Following size grading and flotation, all materials in the first four grades were hand sorted into various material classes. Sorting of G5 grade material was not conducted because of the enormous amount of time required to sort this grade. Table 4 presents the series of material classes and size grade cut-off points for each material class during the sorting. The sorting of water-screened debris was the most tedious and time-consuming process. It was conducted in the following manner: all materials in G1 were hand sorted according to the list of material classes. Sorted materials were then kept separate by using either paper bags or vials. All waterscreened debris in G2, G3 and G4 were processed in the same manner.

Table 4 . Information categories sorted from heavy and light fractions according to size grades, 32BA418.

Material Class		Size Grade Sorted From G1	G2	G3	G4	G5
Chipped Stone:	Patterned Tools	none present				
	Waste Flakes	x	x	x	x	
Granitic Fragments		x	x	x		
Bone		x	x	x	x	
Shell		x	x	x	x	
Botanical Remains: Ident. Seeds and Plants		x	x	x	x	
Insect Parts		x	x	x	x	

The light fraction materials in G4 were sorted into gastropods (shell category) and rootlets employing the size cut-off points for each material class. No other light fraction materials such as charcoal were present. The heavy fraction materials in G4 were also sorted into material and artifact classes. Identical class materials for G1 through G4 were then placed in a larger bag and ultimately stored in their respective boxes by material class. Artifact concentrations 1, 2 and 3 of N209E193 and artifact concentration 1 of N200E189 were processed, sorted and analyzed as discrete units.

During the laboratory phase, catalog numbers were assigned to the heavy and light fractions. The catalog numbers were assigned to these materials on the basis of their provenience. Catalog number 1 (CN1) was assigned to the surface. The remaining CN numbers were assigned according to excavation level and unit provenience. For example, level 1 of unit N200E200 was assigned CN 27, level 2 CN 28, level 3 CN 29, level 4 CN 30, level 5 CN 31 and level 6 CN 32. All materials found in each of these levels were then assigned the respective catalog number. Material from artifact concentrations were assigned catalog numbers separate from the unit/level from which they were extracted. These materials were handled discretely and not intermixed with materials from the general level from which they came. Soil samples were also assigned discrete catalog numbers and the materials (land snails) extracted from the samples received the corresponding catalog number. The following lists the catalog numbers and their provenience.

CN 1 Surface
2 N164E166.5
Level 1
0-10 cm
3 N164E166.5
Level 2
10-20 cm
4 N164E166.5
Level 3
20-30 cm
5 N164E166.5
Level 4
30-40 cm
6 N164F166.5
Level 5
40-50 cm
7 N164E166.5
Level 6
50-60 cm
8 N164E166.5
Level 7
60-70 cm
9 N164E166.5
Level 8
70-80 cm
10 N210E200
Level 1
0-10 cm
11 N210E200
Level 2
10-20 cm
12 N210E200
Level 3
20-30 cm
13 N210E200 (S.E. quadrant only)
Level 4
30-40 cm
14 N210E200 (S.E. quadrant only)
Level 5
40-50 cm
15 N209E193
Level 1
0-10 cm
16 N209E193
Level 2
10-20 cm
17 N209E193
Level 3
20-30 cm
18 N209E193
Level 4
30-40 cm
19 N209E193
Level 5
40-50 cm

CN 20 N209E193
Level 5 (includes artifact concentration #1)
40-50 cm
21 N209E193
Level 6 (includes artifact concentration #1)
50-60 cm
22 N209E193
Level 6 (includes artifact concentration #2)
50-60 cm
23 N209E193
Level 6
50-60 cm
24 N209E193
Level 7
60-70 cm
25 N209E193
Level 7 (includes artifact concentration #3)
60-70 cm
26 N209E193
Level 8
70-74 cm
27 N200E200
Level 1
0-10 cm
28 N200E200
Level 2
10-20 cm
29 N200E200
Level 3
20-30 cm
30 N200E200
Level 4
30-40 cm
31 N200E200
Level 5
40-50 cm
32 N200E200
Level 6
50-60 cm
33 N200E189
Level 1
0-10 cm
34 N200E189
Level 2
10-20 cm
35 N200E189
Level 3
20-30 cm
36 N200E189
Level 4
30-40 cm

CN 37 N200E189
Level 5
40-50 cm

38 N200E189
Level 5 (includes artifact concentration #1)
40-50 cm

39 N200E189
Level 6
50-60 cm

40 N200E189
Level 7
60-75 cm (variable)

41 N209E193
Level 3
20-30 cm
Special sample, 2 liters waterscreened for snails

42 N209E193
Level 4
30-40 cm
Special sample, 2 liters waterscreened for snails

43 N209E193
Level 5
40-50 cm
Special sample, 2 liters waterscreened for snails

44 N209E193
Level 6
50-60 cm
Special sample, 2 liters waterscreened for snails

45 N209E193
Level 7
60-70 cm
Special sample, 2 liters waterscreened for snails

46 N200E189
Level 3
20-30 cm
Special sample, 2 liters waterscreened for snails

47 N200E189
Level 4
30-40 cm
Special sample, 2 liters waterscreened for snails

48 N200E189
Level 5
40-50 cm
Special sample, 2 liters waterscreened for snails

CN 49 N200E189
Level 6
50-60 cm
Special sample, 2 liters waterscreened for snails

50 N200E189
Level 7
60-70 cm
Special sample, 2 liters waterscreened for snails

THEORETICAL AND METHODOLOGICAL OVERVIEW

The purpose of this section is to outline a statement of the goals of the Corps of Engineers and the study researcher, the theoretical and methodological orientation of the study and the research strategies that were applied in achieving the stated goals. The goals can best be subsumed into two categories, resource management goals and scientific goals. Since proper resource management is predicated upon an understanding of the scientific basis of the project, the two categories are inseparable.

Resource Management Goals

The investigation was conducted in partial fulfillment of the resource management obligations of the Corps. These obligations are set forth in the Historic Preservation Act of 1966 (Public Law (P.L.) 89-665), the National Environmental Policy Act of 1969 (P.L. 91-190), Executive Order (E.O.) 11593 for the Protection and Enhancement of the Cultural Environment (Federal Register, 13 May 1971), the Archaeological Conservation Act of 1974 (P.L. 93-291), the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR Part 800), the Department of the Interior guidelines concerning cultural resources (36 CFP Part 60), and Corps of Engineers regulations (ER 1105-2-460) "Identification and Administration of Cultural Resources" (Federal Register, 3 April 1978).

In addition to the general obligations of the Corps in regard to cultural resources, specific information on more traditional goals of archaeology was required. These goals were as follows:

a) determine the existence of cultural materials and/or features at site 32BA418.

b) determine the condition of cultural materials in regard to degree of disturbance (e.g., in situ or disturbed).

c) determine the horizontal and vertical distribution of the remains.

d) determine the cultural affiliation of site 32BA418.

A final goal affiliated with resource management was to offer recommendations of the significance of site 32BA418 according to the National Register of Historic Places (NR). The recommendations were to include a justification for the significance or non-significance rating, including what research questions the site can answer.

Scientific Goals

The theoretical orientation in assessing 32BA418 is largely site specific. This is necessitated by a lack of comparative data within the region. Numerous surveys have been conducted (Fox 1980a; Vehik and Vehik 1977; Vehik 1978), but the results do not provide data compatible with phase II testing results. Some testing has been conducted on the Sheyenne River. A burial was removed from an area adjacent to the Sheyenne River near Ashtabula Crossing (Fox 1980a:51). Hewes (1949) excavated at the Baldhill Mounds in the vicinity of Baldhill Creek, a tributary of the Sheyenne. The results of these investigations deal with artifact classes other than those recovered from 32BA418. There is comparable data from the Quast site (32LM234) on the James River in La Moure County where marrow extraction was a primary activity (Vehik 1977).

Analysis was conducted in an attempt to address several site specific hypotheses that were developed following the survey and auger testing phases of 1978 and 1979. These hypotheses have been briefly discussed in the Auger Testing section. They are reiterated here:

1) 32BA418 represents a bison jump kill site and the remains at the site are the result of butchering bison.
2) Only primary stages of butchering were carried out here and this serves as evidence for the hypothesis that the site is a kill location.
3) Latter stages of butchering were carried out within a different area of the site or at some location removed from the site.
4) Much of the site where other activities related to the kill may have have been conducted have been inundated or destroyed by wave action.

The methodology used to test these hypotheses centers around the analyses of information categories. Prior to commencing analyses, it was anticipated that certain information categories would be available in order to test these hypotheses. This anticipation was based upon the impressions received during

the auger and 1 m^2 testing phases. It was clear that these categories included chipped stone, granitic material and bone. Later, during the sorting process, other information categories were identified that would be useful in conducting the analyses. Specifically, these included land snails (shell), insect parts and botanical remains.

Within each of the various information categories, differing methodologies pertinent to the nature of the category were utilized. The methodologies were predicated upon theoretical orientations designed to address the hypotheses advanced earlier. The orientations and methodologies are addressed separately as specific issues pertinent to each information category. Thus, each information category discussion contains the specific theoretical orientation and methodology used within that category.

There is one information category that was not derived from the archaeological remains. This is the geomorphology information category. This information category was employed specifically to address questions on the depositional nature of the site. It was thought that this would be useful in answering questions regarding the temporal aspect of the site and the nature of the subsurface distribution of cultural material. Thus, a geomorphological analysis is included in this report.

GEOMORPHOLOGY

By John W. Wyckoff

Geomorphic Setting

Site 32BA418 is located principally at the base of a relatively steep (20 to 30%) bluff overlooking the reservoir. It extends, elevationally, from the reservoir high-water mark, along the top edge of a rip-rap fill on the reservoir's margin, upslope to approximately the 416 m contour. The entire range of elevation is about 20 m.

Topography of the Sheyenne River valley in the vicinity of the site has been documented by Pederson (1971). In his examination of erosion and sedimentation, Pederson examined a series of cross sections of the river valley along the full length of the reservoir. Within each of these cross sections core samples were extracted and sediments were interpreted. Two of these transects are near site 32BA418, one less than 1.6 km upstream and the second less than 2.4 km downstream (Figures 10, 11 and 12). From these cross sections it is apparent that the site is located approximately 3 m above the preimpoundment floodplain of the river and that the channel was near the valley wall on which the site is located. It is not possible to closely estimate how close the site was to the river channel at the time of occupation(s).

The Sheyenne River and the surrounding landscape have undergone numerous changes during the Quaternary. Glacial advances and retreats in the region have been examined by Clayton (1966) and by Kelly and Block (1967). In addition, Kelly and Block (1967) have outlined an evolutionary sequence for the development of the modern Sheyenne River valley (Figure 13). The dominant geomorphic feature at site 32BA418 is the escarpment (bluff) which forms the eastern lateral margin of the site. This escarpment has been described as the Luverne end moraine (Clayton 1966; Kelly and Block 1967). Luverne Drift (type locality, section 32, Township 144 North, Range 57 West) and the end moraine described above were deposited in the Barnes County area during mid-Wisconsin glaciation (Clayton 1966).

Soils

Soils in the vicinity of Lake Ashtabula have been examined and described by Patterson et al. (1968) and by Johnson et al. (1974). According to Patterson, soils on the steeply sloping eastern shoreline of the reservoir (the location of the site) fall into the Buse Loam, hilly and steep (15 to 30% slopes) soil mapping area (Figure 14). Buse loam, hilly and steep areas are described

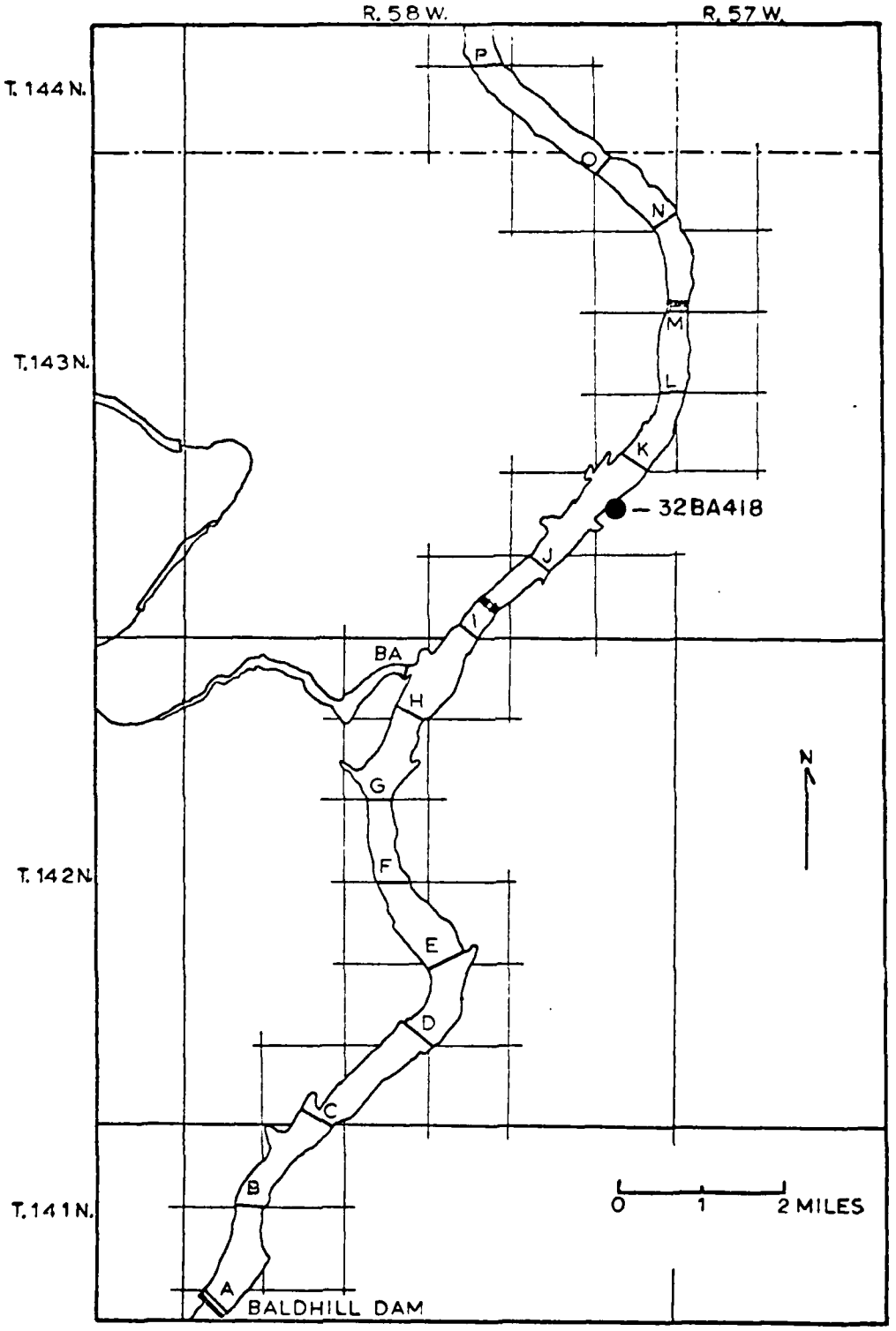
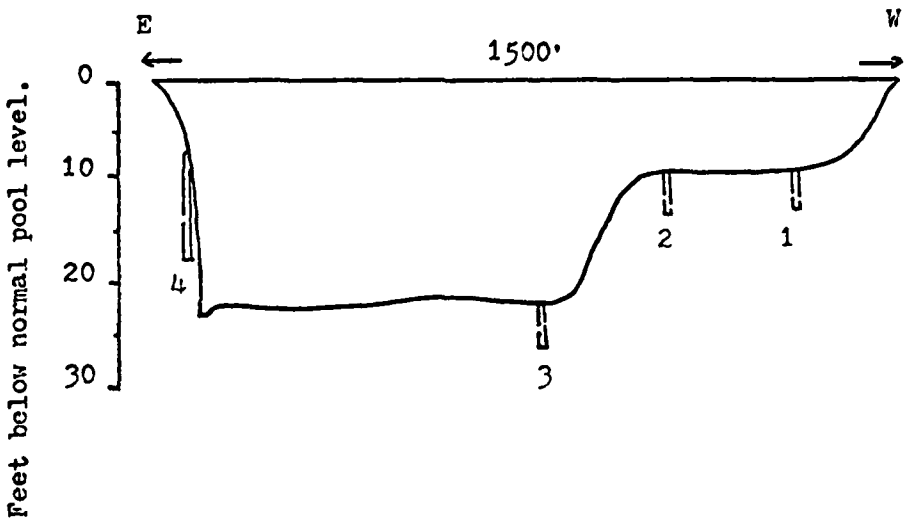


Figure 10. Cross sections of Sheyenne River valley (from Pederson 1971).

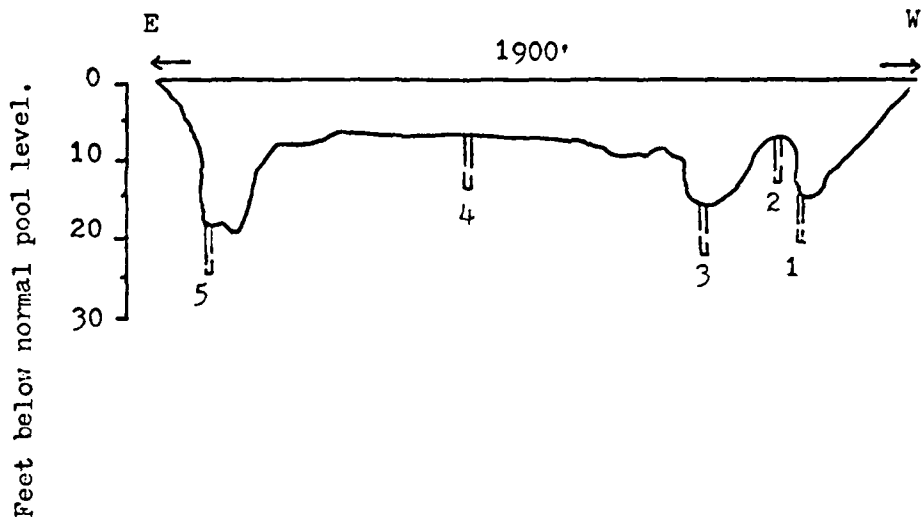


Shore coordinates of profile J

East side: The terminus is the greatest projection of the major headland to the south of the line separating sections 26 and 35. This headland is a fan built out in front of a ravine.

West side: The terminus is the intersection with the lake of the fence line separating sections 26 and 35.

Figure 11. Cross section along range J showing core locations (from Pederson).

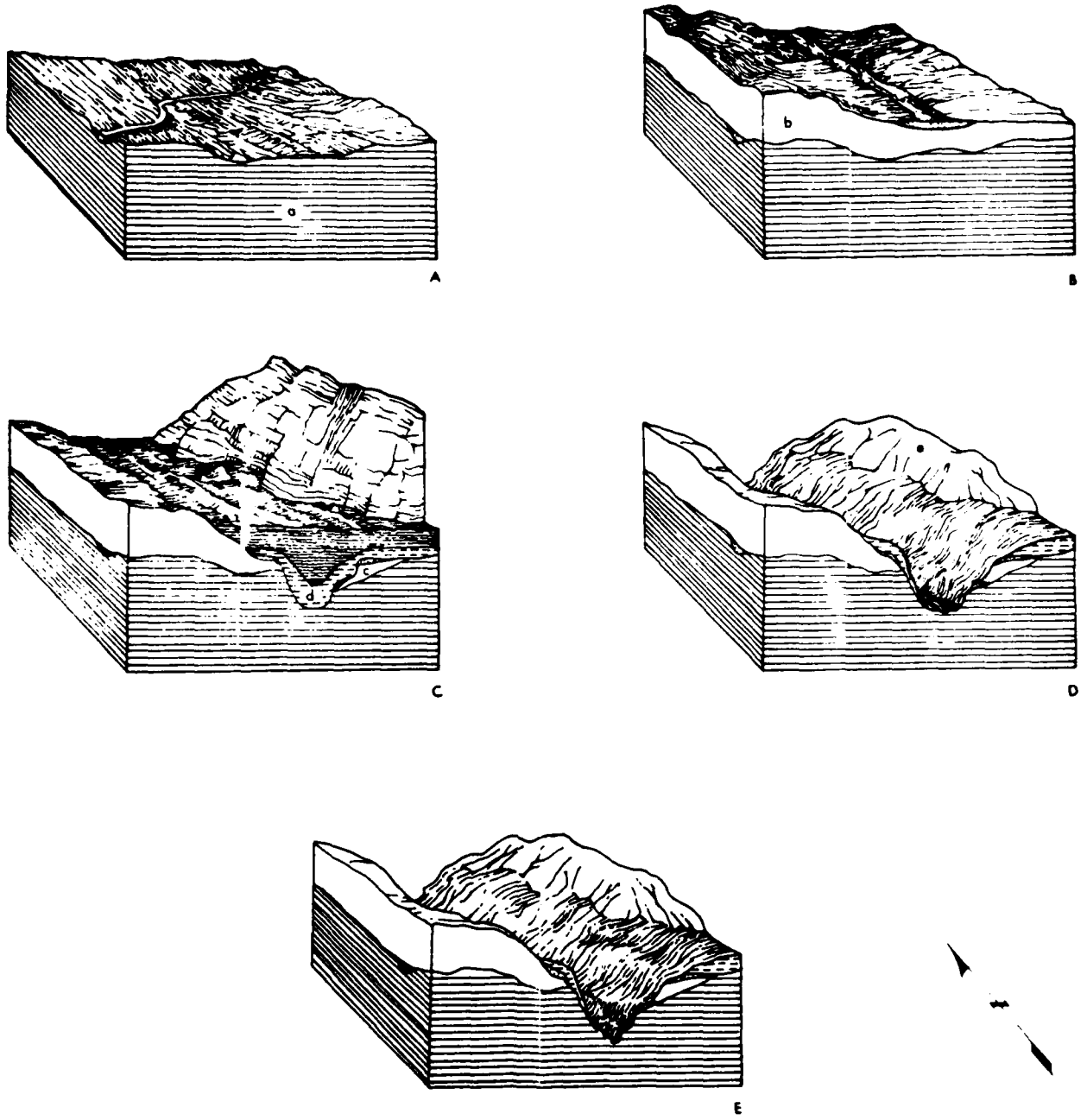


Shore coordinates of profile K

East side: The terminus is the cabin at the end of the major access road (old Highway 26).

West side: The terminus is the south end of the large shelter belt in this area.

Figure 12. Cross section along range K showing core locations.



A) Preglacial streams flowed northeastward over a terrace eroded on Upper Cretaceous shale. B) Upon retreat of glaciers, the Sheyenne River was established as a southward flowing outwash channel. C) Terraces were formed and a lower terrace was eroded. The Sheyenne River was dammed when the glaciers again advanced resulting in formation of a preglacial lake. Lacustrine deposits accumulated in the channel and blanketed the slopes. D) As the dam was breached, most of the lacustrine deposits were stripped from the valley. E) The Sheyenne River has entrenched itself since the draining of Lake Agassiz.

Figure 13. Block diagrams showing the evolution of the Sheyenne River valley and terrace development in southcentral Barnes County, North Dakota (from Kelly and Block 1967).

Map Symbol	Mapping Unit
BbBu	Barnes-Buse loams, rolling (6-9%)
BbSv	Barnes-Svea loams, undulating (3-6%)
BbHa	Barnes-Hamerly loams, undulating (3-6%)
Bu	Buse loams, hilly and steep (15-30%)
BuBb	Buse-Barnes loams, steep (9-15%)
BuLm	Buse-LaMoure loams
BuWLu	Buse-Walsh-Ludden loams
GaGy	Gardena-Glyndon loams, nearly level (0-3%)
HaSv	Hamerly-Svea loams, nearly level (0-3%)
HaV	Hamerly-Vallers loams, nearly level (0-3%)
Hk	Hecla loamy sands with sandy substrata, till substratum, nearly level (0-3%)
Lp	LaPrairie loams, occasionally flooded
Re	Renshaw loams, sandy and gravelly substrum, nearly level (0-3%)
ReSu	Renshaw-Sioux loams, sandy and gravelly substrum, undulating (3-6%)
SvBb	Svea-Barnes loams, nearly level (0-3%)
SvHa	Svea-Hamerly loams, nearly level (0-3%)
	Lake, Reservoir, Marsh, or Pond

Figure 14. Legend Lake Ashtabula Basin soil map on following page.

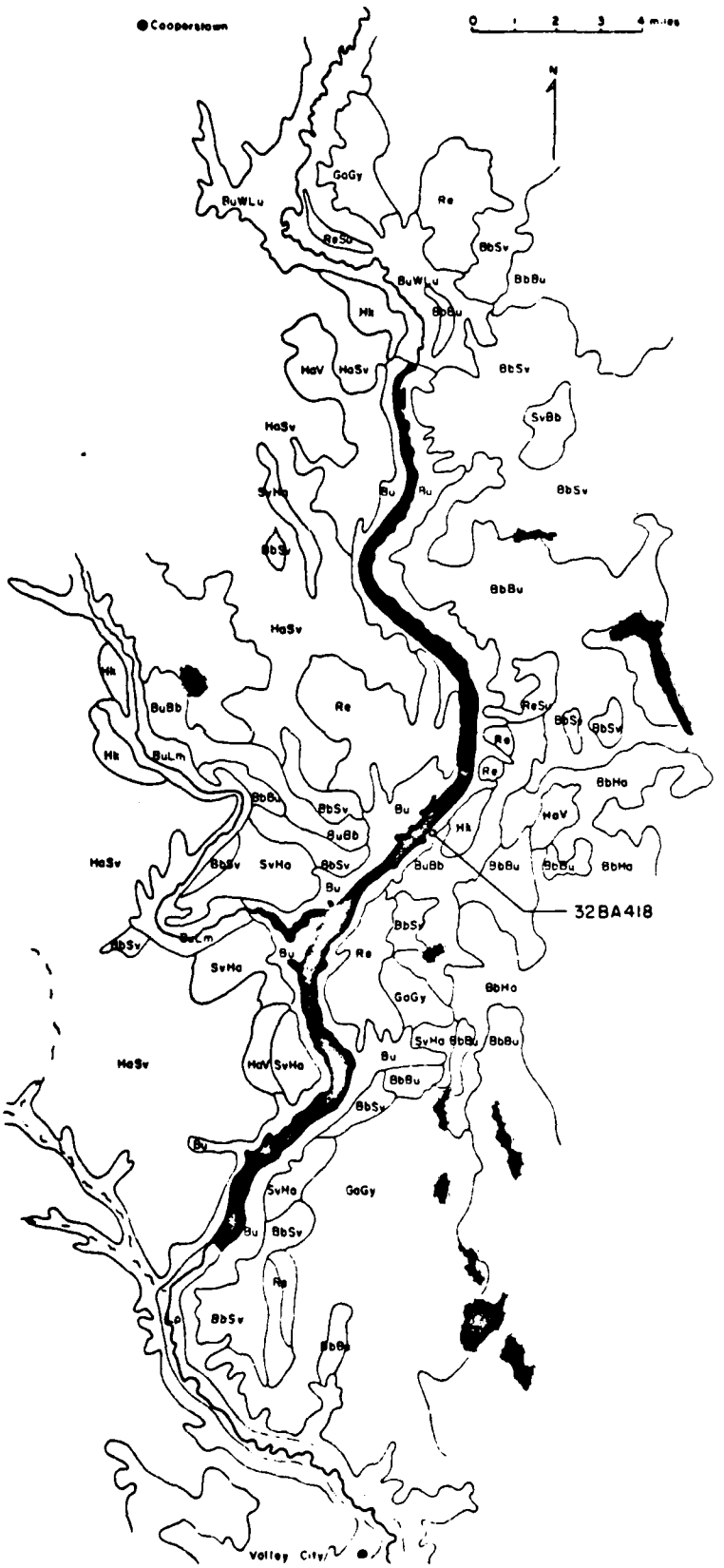


Figure 14 (continued). Lake Ashtabula soil map. Legend is on preceding page.

as soils on steep, irregularly shaped hills, knobs, and ridges. In addition, these soils may be found on steep slopes and ravines bordering stream valleys (Patterson et al. 1968).

Among the soil series present within the Buse loam, hilly and steep mapping area, is the Barnes series which is typically found on lower convex or straight slopes. This series typically may have an A_1 horizon (0 to 15.25 cm) that is black loam, a B_2 horizon (15.25 to 30.5 cm) which is very dark grayish brown loam, a loamy grayish brown C_{ca} horizon (calcic) (30.5 to 61.0 cm), and a C horizon (61.0 to 152.4 cm) that is light olive brown loam. Parent material of this series consists of ". . . loam to clay loam glacial till on short, convex, or plane slopes of ground moraines and on moderate slopes of marginal and end moraines" (Patterson et al. 1968:124).

Physical Setting of the Site

The five excavation units at site 32BA418 were examined during the fieldwork phase of the research (Figure 4). Within these excavation units two natural (physical) stratigraphic units were observed: 1) a glacial till unit and 2) an aeolian/colluvial unit. Soils within the excavations largely resemble the type description of the Barnes soil series previously discussed. However, in most instances the separation of a B_2 horizon, as discussed by Patterson et al. (1968) was not readily apparent.

Typical horizon characteristics within the excavations are as follows: 1) surface horizon of dark brown/black loam that is granular in structure and contains numerous crystalline rock fragments; 2) grayish brown clay loam that is blocky in structure and contains crystalline rock fragments; 3) light yellowish brown clay loam, blocky in structure; and 4) olive gray clay loam with blocky structure (Figure 15).

Most of the physical stratigraphic units observed showed evidence of bioturbation, including filled mammal burrows and abundant earthworm activity.

From these observations it is felt that only the upper stratigraphic unit (aeolian/colluvial unit) represents the solum and that the second stratigraphic unit (upper horizon of the glacial fill) is perhaps an incipient B horizon of largely oxidized glacial till which exhibits moderate illuviation. The lower two horizons within the glacial till unit are weathered and oxidized glacial till which may be contributing some clay mineral to the overlying units via soil turnover by worm casting and rodent disturbance.

Although 32BA418 is located adjacent to the Sheyenne River (now Lake Ashtabula) there is no evidence within the excavations of fluvial sediments. No

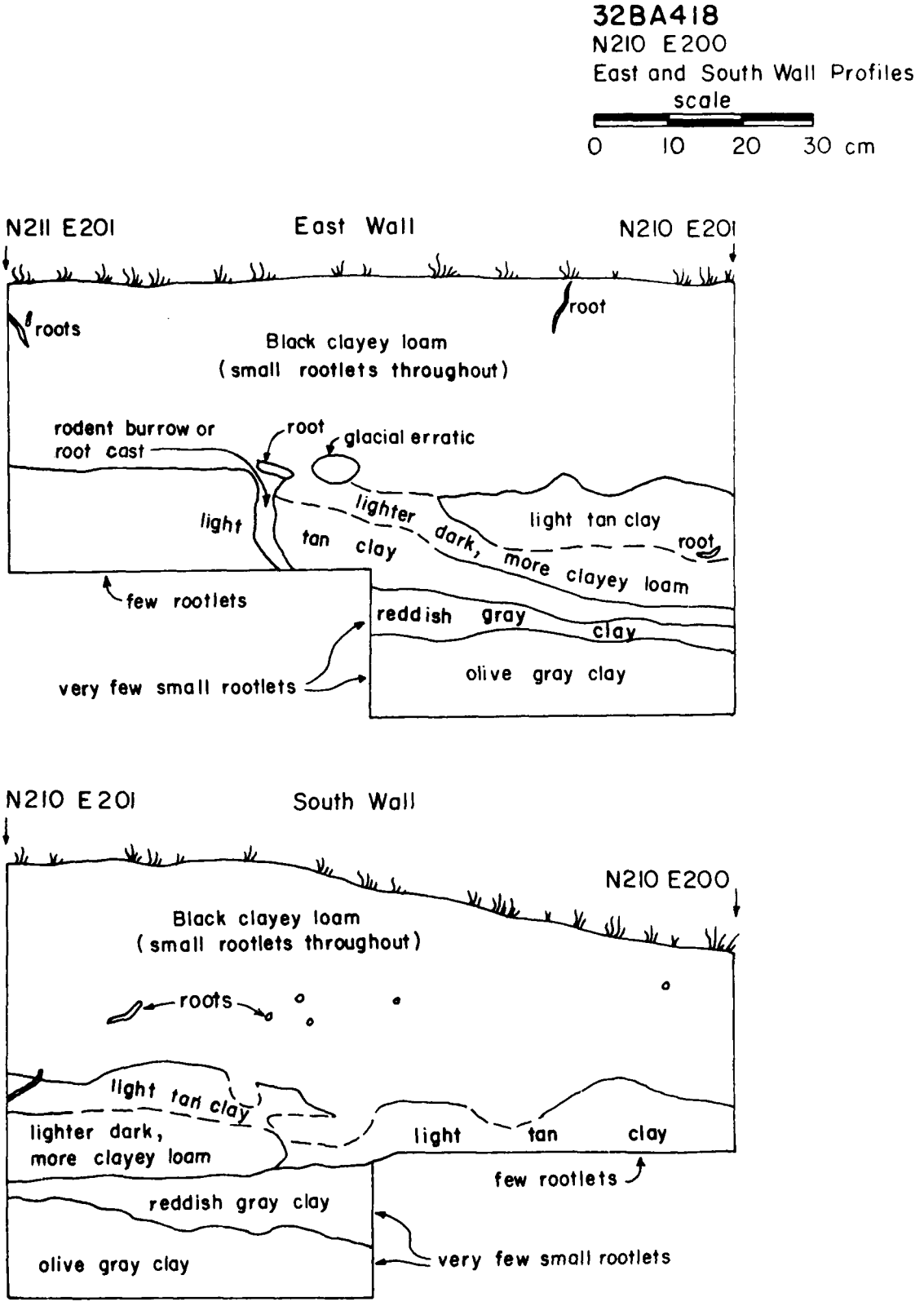


Figure 15. Stratigraphic profile of unit N200E200, 32BA418 showing typical horizon characteristics at the site.

sands or other sorted materials were evident within any of the stratigraphic units observed. Lack of stream deposits at this location may be largely attributed to relief.

Geomorphic Interpretation

Site 32BA418 is located in a relatively unstable location for soil development. This location is characterized by a steppe-like appearance. The small steppes have created an irregular series of flat areas within the site boundaries. In terms of area, the flats make up a very small portion of the site; perhaps 95% of the site area consists of sloping terrain.

The steppe-like appearance may be due to slumping. It is possible that if slumping occurred, it was the direct result of reservoir impoundment (Patterson et al. 1968). In any case, it is unlikely that the slump activity could account for the mixed depositional nature of the cultural materials. This is discussed further in the Implications section.

The solum exhibits poor horizonation and is probably, in large part, unrelated to the lower clayey stratigraphic units. This contention is strongly supported by the presence of bone buried within the siltier surface stratigraphic unit (aeolian/colluvial unit) and its absence in the lower clayey units. This suggests that the surface material was deposited on the lower units rather than being weathered from them. Clayey subsoil units are in all likelihood tills of the Luverne Drift previously discussed.

The aeolian/colluvial unit is composed of sediments of mixed origin, but which are largely contributed by two different geomorphic processes. Poor sorting of soil particles and rocks within the solum, in conjunction with the site's footslope position, strongly suggest colluviation (slope wash and gravitational transfer) as a major factor in deposition. A higher silt content within the solum, coupled with the site's downwind position from the Sheyenne River floodplain, strongly suggests aeolian deposition as a second major source of sediments for the site.

This second hypothesis is supported by the work of Kornbrath (1975), Clayton et al. (1976) and Clayton and Moran (1979). In their studies of surficial geology in North Dakota, these authors have described transported sediments overlying the Coleharbor Formation (Pleistocene glacial and glacio-fluvial sediments) as the Oahe Formation. In many settings the Oahe Formation is largely composed of wind-blown silts deposited over Pleistocene sediments of the Coleharbor Formation (Kornbrath 1975; Clayton et al. 1976).

Clayton et al. (1976) describe four major members of the Oahe Formation, from oldest to most recent: 1) Mallard Island, 2) Aggie Brown, 3) Pick City and, 4) Riverdale. The sequence of post-Wisconsin members (Aggie Brown-Riverdale) within the Oahe are felt to represent periods of cool-moist climate with relatively stable slope conditions and active soil development alternating with relatively warm-dry periods with unstable slopes and rapid aeolian deposition (Figure 16). At 32BA418 it is unlikely that any of the older (mid or early Holocene) members of the Oahe would be present. Because of the very unstable slope conditions that would exist at this site during relatively xeric periods of time, surface erosion would tend to remove soil particles faster than they could be deposited. This evidence would tend to indicate that the upper (colluvial/aeolian) stratigraphic unit present at 32BA418 is no older than late Holocene (upper Riverdale member). It is in this unit that the cultural remains were found.

Implications

The implications of these hypotheses to the cultural stratigraphy of the site are relatively straightforward. First, no cultural materials should be expected within the lower natural stratigraphic unit (Pleistocene clay till). Second, cultural material may be expected within the upper Holocene age sediments (aeolian/colluvial unit). Third, because of the depositional and erosional nature of the site, sediments containing cultural material are probably no older than 1000 to 2000 radiocarbon years. Fourth, on relatively level segments (the steppe-like areas) of the slope, materials may have been buried in relatively intact deposits with little disturbance. Elsewhere, subsurface cultural materials can be expected to be in disturbed context. Fifth, because of the colluvial nature of the site and the lack of soil profile development, discrimination of separate time periods, stratigraphically, within the solum may be impossible.

Summary

Excavations at the site 32BA418 exposed at least two natural (physical) stratigraphic units: 1) Pleistocene till and 2) colluvial-slopewash/aeolian sediments. Soil horizonation observed within the excavations suggests that the site is relatively unstable. Downslope movement of sediments by slopewash and gravitational transfer is indicated by the poorly sorted array of particles present within the upper stratigraphic unit. Bone fragments present in at least one excavation (N209E193) appear to be relatively intact and were probably buried with little disturbance. The dark brown/black aeolian/colluvial sediments

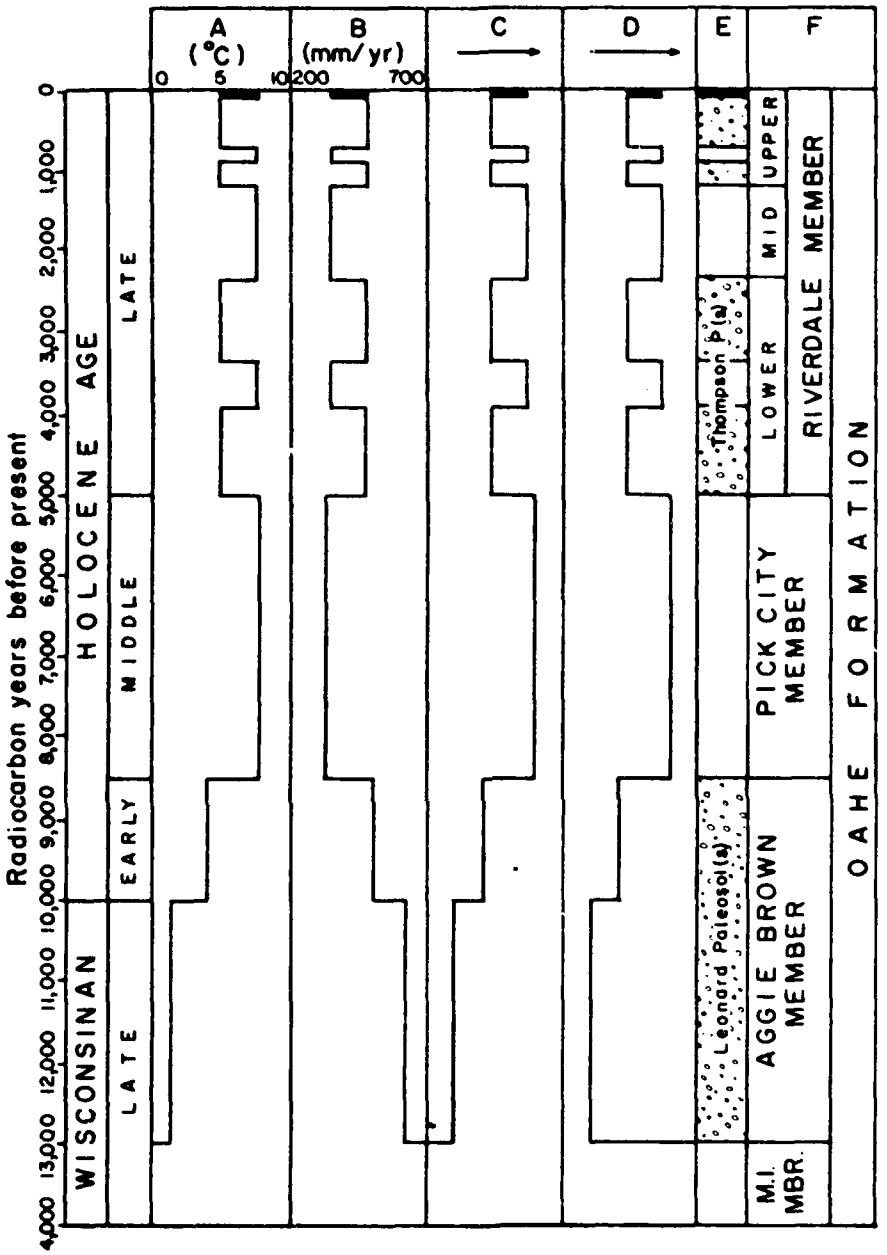


Figure 16. Postglacial (A) mean annual temperature, (B) precipitation, (C) slopewash erosion on steep slopes, (D) aeolian deposition on gentle slopes, (E) periods of conspicuous soil formation and (F) suggested correlations with the subdivisions of the Oahe formation. Values are extremely approximate. Many small fluctuations have been omitted (from Clayton et al. 1976).

that represent the upper stratigraphic unit, are probably of late Holocene age and perhaps no older than 1000 to 2000 years B.P. Because of the relatively unstable nature of the site, intact buried cultural materials should only be found in sediments within the upper stratigraphic unit and only on the more level segments of the slope.

BONE ANALYSIS

By Virginia Gnabasik and Richard A. Fox

Analysis of the faunal material recovered from site 32BA418 proceeded in two phases based upon the three information categories recovered from the site. These information categories were land snails, bone elements,and insect parts Due to time and financial restraints, insect parts were not analyzed (see Other Information Categories section). This section is concerned with the analysis of bone; land snail analysis is discussed in the Land Snails section. The purposes of the bone analysis were to a) identify the remains according to taxa, b) identify the elements, where possible, present in the bone collection, c) determine the nature of the activity of the site based upon bone analysis, d) determine the minimum number of individuals present in the areas tested, and e) determine the seasonality of the site based upon the information provided by the bone.

The bone recovered from site 32BA418 is overall very fragmentary and deteriorated. Other than a nearly complete but deteriorated and badly cracked metatarsal, only a few of the more solid elements (e.g., carpals, tarsals, sesamoids, teeth, and phalanges) are whole or nearly so. Of the 10,880 bones and/or bone fragments recovered from the site, 47 are from grade G1, 220 from grade G2, 1453 from grade G3 and 9160 are from grade G4 (Table A1).

Taxa and Element Identification

The comparative skeletal collection of the Department of Anthropology and Archaeology, University of North Dakota was used to identify the bone recovered from grades G1 and G2. Bone from grades G3 through G4 were not analyzed according to taxa, element or age because the small and highly fragmented nature of these grades precluded such analysis. Tables 5 and 6 provide the specific information. It is apparent that only one species is represented at the site. This species is Bison bison. No elements specifically identifiable to other species were recovered. Bone fragments from G3 and G4 were not identifiable to any taxa beyond large mammal (cf. Bison bison ?) due to their highly fragmentary nature and small size.

Minimum Number of Individuals

Due to the highly fragmented nature of the bone, the small number of

Table 5. Bone Identification - Grade 1

Test Unit Provenience	Level	Catalog Number	Element	Description	Side	Age	Species
N210E200	1	10	cf. metatarsal	distal end fragment	-	immature?	cf. Bison bison
N209E193	2	16	first phalange	proximal epiphysis not present	right	immature	Bison bison
	4	18	mandible	condyle	right	-	Bison bison
	5	19	second phalange	-	left	-	Bison bison
	5	19	mandible	2 fragments	-	-	Bison bison
	5	19	tooth	-	-	-	Bison bison
	5	19	rib	2 fragments of same rib, fit together	-	-	Bison bison
	5	19	radial carpal	-	-	-	Bison bison
N209E193 artifact concentration #1							
	6	21	calcaneus	-	left	-	Bison bison
	6	21	third phalange	-	left	-	Bison bison
	6	21	naviculo-cuboid	-	left	-	Bison bison
	6	21	cf. radius	proximal end fragment	right	-	cf. Bison bison
N209E193 artifact concentration #2							
	6	22	metatarsal	proximal end fragment	left	-	Bison bison
	6	22	humerus	shaft fragment	right	-	Bison bison
	6	22	tibia	shaft fragment	right	-	Bison bison
	6	22	radius	shaft fragment	left	-	Bison bison
	6	22	3 longbone fragments	unidentifiable	-	-	cf. Bison bison
N209E193	6	23	longbone fragment	unidentifiable	-	-	cf. Bison bison
	6	23	thoracic vertebra	fragment	-	-	Bison bison
	6	23	cf. ilium	cf. acetabulum	right	immature?	cf. Bison bison
N209E193 artifact concentration #3							
	7	25	femur	proximal end - 3 fragments of same bone	left	adult	Bison bison
	7	25	lumbar vertebra	body	-	-	Bison bison
	7	25	tibia	2 fragments of tibial crest, fit together	left	immature?	Bison bison

(Table continued on next page.)

Table 5. Bone Identification - Grade 1 (continued).

Test Unit Provenience	Level	Catalog Number	Element	Description	Side	Age	Species
N209E193							
artifact concentration #3 (continued)							
	7	25	tooth	three, these fit mandible fragments of this same catalog number	left	-	Bison bison
	7	25	mandible	three horizontal ramus fragments, fit together with teeth of this same catalog number	left	-	Bison bison
	7	25	mandible	ascending ramus, rodent gnaw marks	left	-	Bison bison
	7	25	carpal	-	-	-	Bison bison
N200E200	3	29	ulna	semilunar notch	left	-	Bison bison
	4	30	metatarsal	nearly complete; distal epiphysis not present; proximal only partially fused	left	immature	Bison bison
	4	30	accessory carpal	-	-	-	Bison bison
	4	30	ulnar carpal	-	-	-	Bison bison
	4	30	cf. rib	fragment	left	-	cf. Bison bison
N200E189	4	36	longbone fragment	unidentifiable	-	-	cf. Bison bison
N200E189							
artifact concentration #1							
	5	38	2 teeth	-	-	-	Bison bison
	5	38	rib	neck fragment	right	-	Bison bison

Table 6. Bone Identification - Grade 2

Test Unit Provenience	Level	Catalog Number	Element	Description	Side	Age	Species
N164E166.5	2	3	rib	fragment	-	-	Bison bison
	4	5	tooth	2 fragments	-	-	Bison bison
N210E200	1	10	bone fragment	unidentifiable	-	-	Bison bison ?
	2	11	bone fragment	unidentifiable	-	-	Bison bison ?
	3	12	lateral malleolus	-	right	-	Bison bison
N209E193	1	15	rib	fragment	-	-	Bison bison
	1	15	sesamoid	-	-	-	Bison bison
	2	16	2 bone fragments	unidentifiable	-	-	Bison bison ?
	2	16	rib	shaft fragment	-	-	Bison bison
	3	17	tooth	-	-	-	Bison bison
	3	17	5 longbone fragments	unidentifiable	-	-	cf. Bison bison
	3	17	cf. carpals or sesamoids	two	-	-	cf. Bison bison
	3	17	fifth metacarpal	-	-	-	Bison bison
	4	18	longbone fragment	unidentifiable	-	-	cf. Bison bison
	4	18	rib	3 fragments	-	-	Bison bison
	4	18	10 bone fragments	unidentifiable	-	-	Bison bison ?
	5	19	rib	10 fragments	-	-	Bison bison
	5	19	mandible	4 fragments	-	-	Bison bison
	5	19	cf. mandible	cf. ascending ramus	right	-	cf. Bison bison
	5	19	3 longbone fragments	unidentifiable	-	-	cf. Bison bison
	5	19	cf. thoracic vertebra	cf. articular surface	-	-	cf. Bison bison
	5	19	7 bone fragments	unidentifiable	-	-	Bison bison
N209E193 artifact concentration #1							
	5	20	femur	shaft fragment with foramen	-	-	Bison bison
	5	20	rib	fragment	-	-	Bison bison
	5	20	bone fragment	unidentifiable	-	-	Bison bison ?
	6	21	rib	12 fragments	-	-	Bison bison
N209E193 artifact concentration #2							
	6	22	rib	19 fragments	-	-	Bison bison

(Table continued on next page.)

Table 6. Bone Identification - Grade 2 (continued).

Test Unit Provenience	Level	Catalog Number	Element	Description	Side	Age	Species
N209E193	6	23	rib	12 shaft fragments	-	-	Bison bison
	6	23	mandible	3 fragments	-	-	Bison bison
	6	23	cf. rib	two cf. head-neck-tubercle fragments, fit together	-	-	cf. Bison bison
	6	23	longbone fragment	unidentifiable	-	-	cf. Bison bison
	6	23	2 bone fragments	unidentifiable	-	-	Bison bison ?
	7	24	rib	10 fragments	-	-	Bison bison
N209E193 artifact concentration #3							
	7	25	tooth	1 whole and 6 fragments	-	-	Bison bison
	7	25	mandible	12 fragments	-	-	Bison bison
	7	25	rib	24 shaft fragments from at least 2 different ribs	-	-	Bison bison
	7	25	thoracic vertebra	fragment	-	-	Bison bison
	7	25	cf. vertebra	3 fragments, cf. articular processes	-	-	cf. Bison bison
	7	25	sesamoid	-	-	-	Bison bison
N200E200	2	28	bone fragment	unidentifiable	-	-	Bison bison ?
	3	29	sesamoid	-	-	-	Bison bison
	3	29	mandible	fragment	-	-	Bison bison
	3	29	rib	4 fragments	-	-	Bison bison
	3	29	longbone fragment	unidentifiable	-	-	cf. Bison bison
	3	29	4 bone fragments	unidentifiable	-	-	Bison bison ?
	4	30	tooth	-	-	-	Bison bison
	4	30	third phalange	2 fragments	left	-	Bison bison
	4	30	rib	15 fragments	-	-	Bison bison
	4	30	2 bone fragments	unidentifiable	-	-	Bison bison ?
	5	31	cf. sesamoid	-	-	-	cf. Bison bison
N200E189	3	35	rib	5 fragments	-	-	Bison bison
	4	36	longbone fragment	unidentifiable	-	-	cf. Bison bison
	4	36	tooth	-	-	-	Bison bison
	4	36	rib	1 shaft fragment with rodent gnaw marks	-	-	Bison bison

(Table continued on next page.)

Table 6. Bone Identification - Grade 2 (continued).

Test Unit Provenience	Level	Catalog Number	Element	Description	Side	Age	Species
N200E189 (continued)							
	4	36	phalange	fragment of proximal articular surface	left	-	Bison bison
	4	36	2 bone fragments	unidentifiable	-	-	Bison bison ?
	5	37	rib	2 fragments	-	-	cf. Bison bison
	7	40	2 bone fragments	unidentifiable	-	-	Bison bison ?

age diagnostic bones/bone fragments present, and a lack of bones such as long bones identifiable to side, the minimum number of individuals cannot be precisely determined. There is evidence for the presence of possibly two individuals (1 immature, 1 adult) represented in those areas of the site tested. It is also possible that only one individual is present, a young adult at an age where some of the epiphyses were in the process of fusing while others were still completely separated from the diaphysis (or nearly completely fused). Stated another way, the range of epiphysis/diaphysis fusion present in the few bones/bone fragments identifiable might reflect the different fusion times of various bones of a single individual, or they might indicate the presence of at least two individuals of differing ages.

Seasonality

Frison (1978:44-52) has outlined methods by which site seasonality can be estimated based upon analysis of dental eruption (especially in immature individuals) and the potential in using epiphyseal fusion. In general, it was anticipated that some preliminary statements could be made bearing upon the season of use of site 32BA418 based upon these techniques. Two limitations, however, hampered this anticipation. First was the finding of only one or two individuals and the paucity of the elements (especially dentition) relevant to seasonality determinations. Second was the lack of time and finances to adequately assess these individual(s) according to the seasonality. In light of these limitations, it was deemed unwise to initiate seasonality studies. It is felt that a larger sample of whatever population might be represented at the site would be necessary for such studies and this would require more time and effort than can be expended at this point in the investigations.

Cultural Activity at the Site

The primary cultural activity at the site can be hypothesized on the basis of the bone remains from the general excavation levels throughout the site and on the basis of several of the artifact concentrations. The remains from the general excavation levels are considered first. All analyses were based upon macroscopic examination.

Many of the identifiable elements from grades G1 and G2 recovered from the general excavation levels exhibit green bone fractures. Precise identification of the fractures was not possible because of the deteriorated condition of the bone fragments. But these bones typically exhibit the sharp, angular fractures that are characteristic of breaking green (cf. fresh)

bone. Further, many of the bone elements are of those that typically contain the larger amounts of marrow and/or grease (e.g., ribs, long bones). In general, butchering marks such as cut marks are not present. It appears the bones were fractured by blows using the hammer and anvil technique (stone against stone). It is probable that these elements were fractured to obtain the bone marrow and be processed for grease extraction.

Other evidence typical of bone processing to obtain grease is evident in the form of bone fragments contained in grades G3 through G5. Over 10,000 bone fragments were recovered from grades G3 and G4. Although grade G5 was not sorted and quantified, it is apparent that many thousands of fragments are contained in this grade. Fragmented bone is a typical byproduct of bone marrow extraction but these small fragments suggest processing for grease. No evidence of butchering cut marks are found on bone from the lower two grades examined. This is not atypical at sites that exhibit bone fragmenting for marrow and grease. Vehik (1977:176) found cut marks on only 20 speciments out of a total of 4000 found at the Quast site on the James River in LaMoure County, North Dakota. A similar situation exists at site 32RM4 adjacent to the Sheyenne River near Lisbon, North Dakota (Fox 1980b). Both the Quast site and 32RM4 were interpreted as containing areas where bone fragmentation to process for grease was carried out. Although the soil dynamics at the site under scrutiny (32BA418) have apparently been rather active (see the Geomorphology section), these dynamics can in no way account for the prolific nature of the fragmented bone (Wyckoff, personal communication 1982).

Artifact Concentrations

Artifact concentration 1 (AC 1), test unit N200E189 contained only three bone fragments, two teeth and a rib. This concentration was identified in the field during excavation when it was thought that it may develop into a concentration such as those found in unit N209E193. This was not the case, however, and it is now thought the AC 1, unit N200E189 does not represent a concentration as those discussed below. In any case, the remains in AC 1 are sparse and thought to represent nothing more than the general distribution of the bone remains at the site (see Figure 8).

Artifact concentrations 1, 2 and 3 (AC 1, 2 and 3), unit N209E193 are considered to be more productive in determining cultural activity at the site. Figures 17, 18, 19 and 20 depict these concentrations in plan fashion. AC 1 began at 47 cm below the surface and continued to a depth of 60 cm (Figures 17 and 18). Ac 2 was contained within the 56 to 60 cm range (Figure 19).

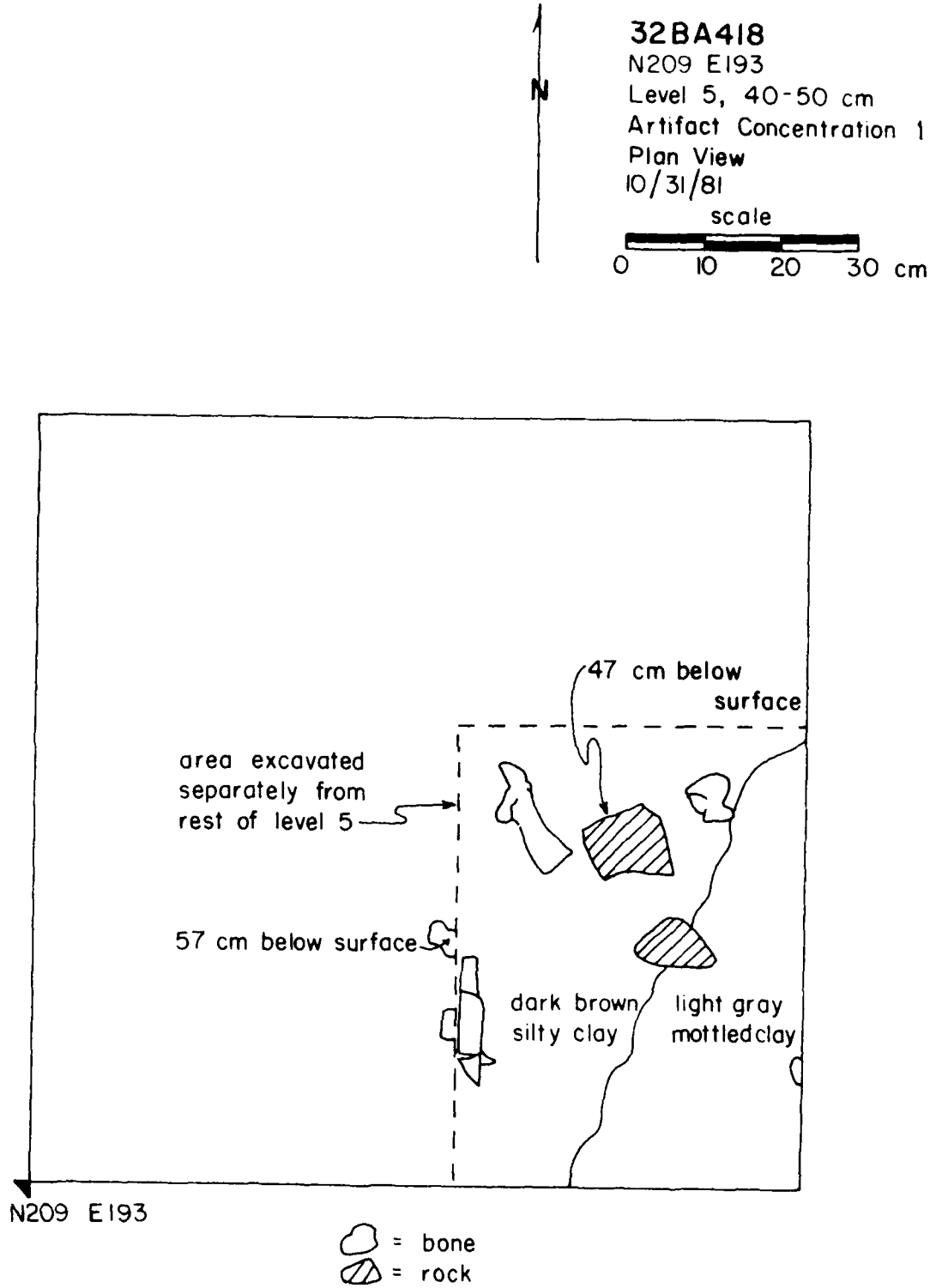

N
32BA418
N209 E193
Level 5, 40-50 cm
Artifact Concentration 1
Plan View
10/31/81
scale
0 10 20 30 cm
47 cm below surface
area excavated separately from rest of level 5
57 cm below surface
dark brown silty clay
light gray mottled clay
N209 E193
= bone
= rock

Figure 17.

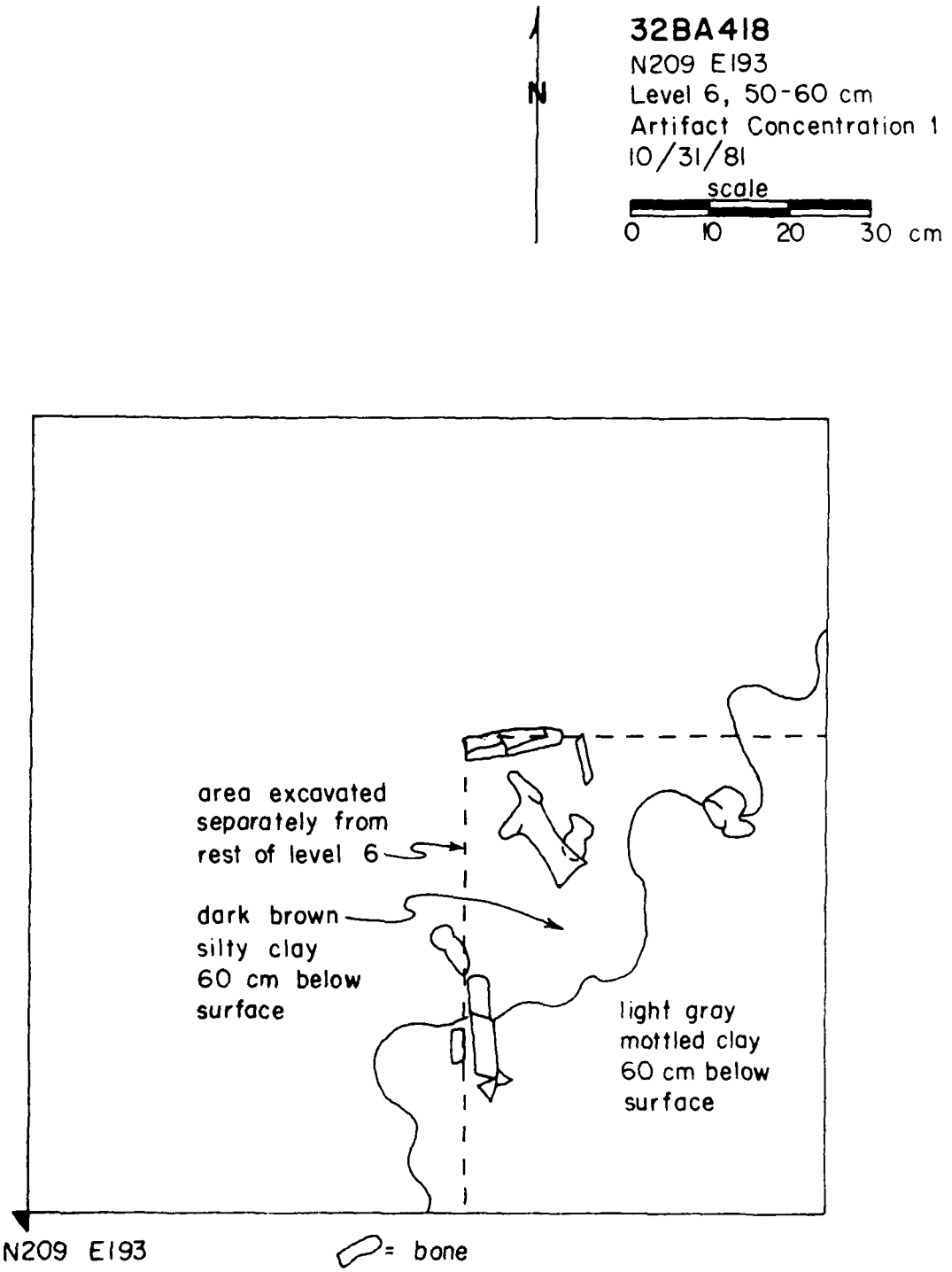

N
32BA418
N209 E193
Level 6, 50-60 cm
Artifact Concentration 1
10/31/81
scale
0 10 20 30 cm
area excavated
separately from
rest of level 6
dark brown
silty clay
60 cm below
surface
light gray
mottled clay
60 cm below
surface
N209 E193
= bone

Figure 18.

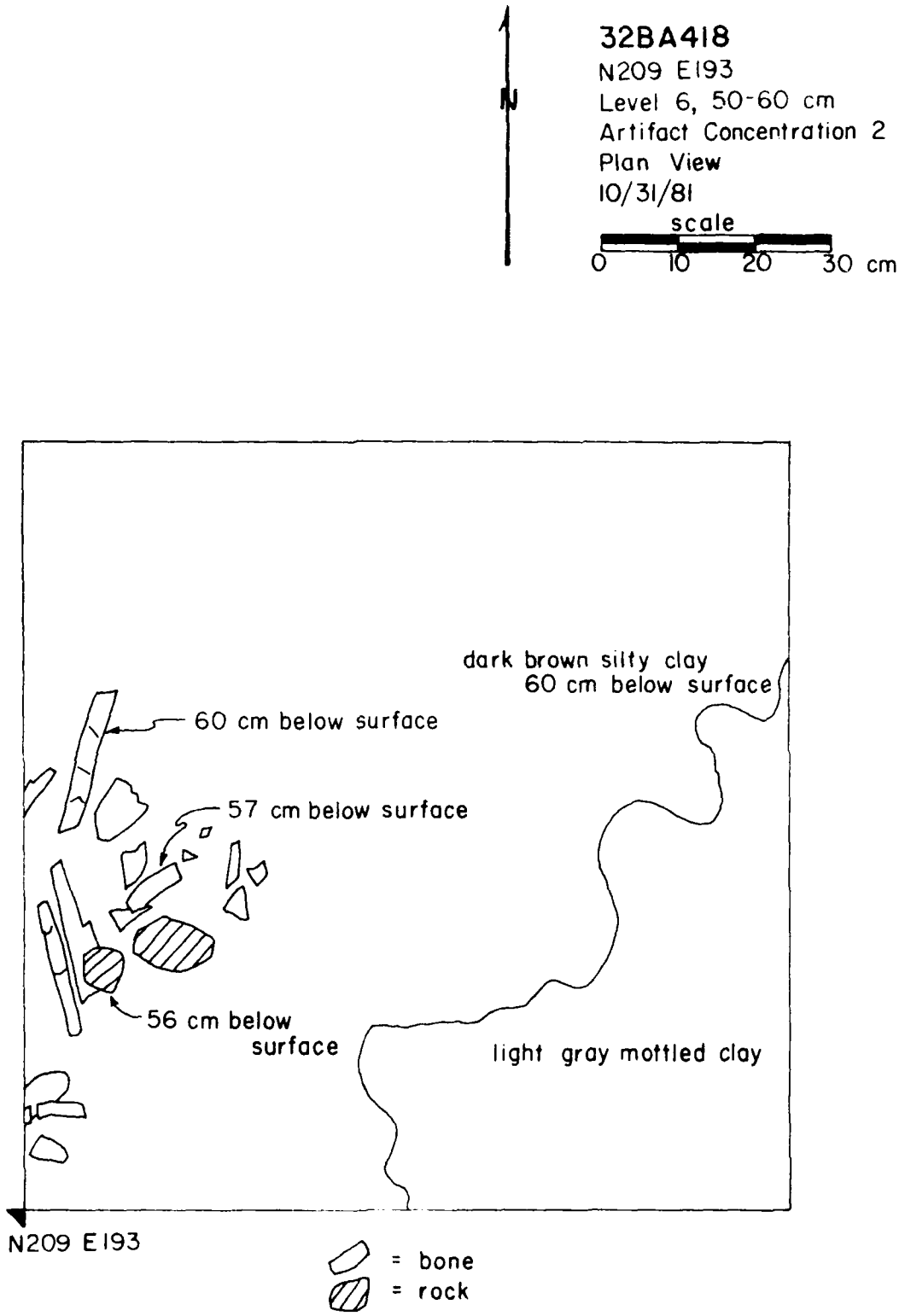

32BA418
N209 E193
Level 6, 50-60 cm
Artifact Concentration 2
Plan View
10/31/81
scale
0 10 20 30 cm
N
dark brown silty clay
60 cm below surface
60 cm below surface
57 cm below surface
56 cm below surface
light gray mottled clay
N209 E193
= bone
= rock

Figure 19.

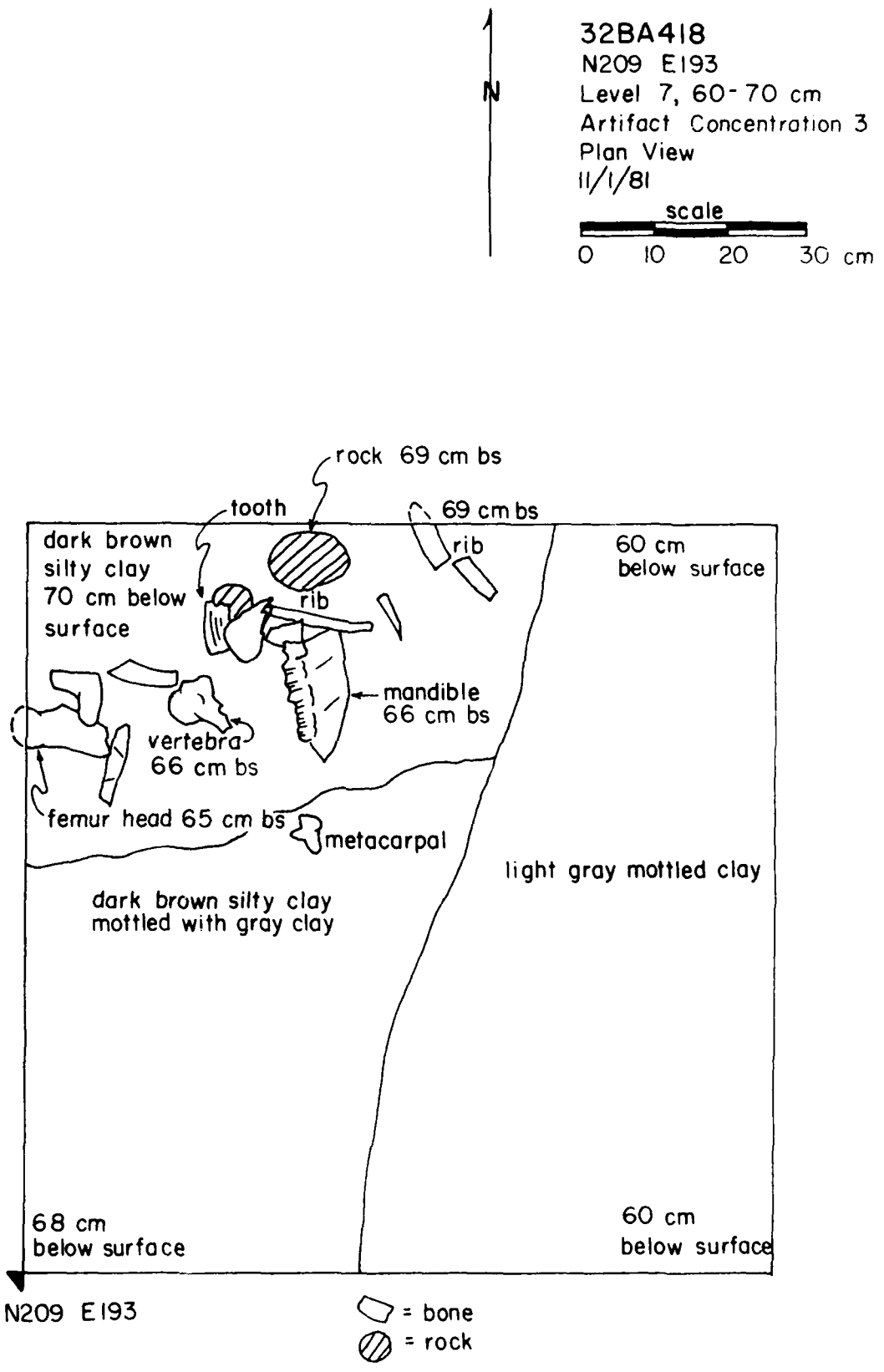

N
32BA418
N209 E193
Level 7, 60-70 cm
Artifact Concentration 3
Plan View
11/1/81
scale
0 10 20 30 cm
rock 69 cm bs
tooth
69 cm bs
rib
dark brown
silty clay
70 cm below
surface
rib
60 cm
below surface
mandible
66 cm bs
vertebra
66 cm bs
femur head 65 cm bs
metacarpal
light gray mottled clay
dark brown silty clay
mottled with gray clay
68 cm
below surface
60 cm
below surface
N209 E193
= bone
= rock

Figure 20.

AC 3 was found at a depth range of 65 to 70 cm (Figure 20). All three artifact concentrations were in different quadrants of the same unit and contained bone in association with stone.

Taken collectively, the concentrations ranged from 47 to 70 cm in depth. Geomorphological analysis suggest that the soil dynamics at the site are of a nature that precludes the identification of stratigraphicaly separated components. For this reason, and because they were found in close horizontal association the concentrations are considered as one acitivity locus and analyzed as such.

The bone in AC 1 is whole and has not been fragmented. Bone in AC 2 and AC 3, however, exhibits green bone fracturing of elements that typically contain larger amounts of marrow and grease (e.g., head-neck tubercle, long bone shafts). Found in association with these elements were stones that clearly exhibit use as hammers and anvils. Much of these stones are of a granitic variety; one stone in particular, a basaltic fragment found in AC 3 has clearly been used as a hammerstone. It exhibits irregular flake scar use-wear on a distal end. The unidentifiable, highly fragmented, small bone fragments found in these three concentrations support the conclusion that bone marrow and grease extraction was conducted in this locality of the site.

In sum, the bone remains suggest that a primary activity at the site was centered around bone marrow extraction and processing for grease. At one location within the site, in the area of unit N209E193, there appears to be a definite locus representing bone marrow extraction activities. Other than the presence of a very large quantity of small bone fragment, direct evidence for bone grease extraction is lacking in the excavated sample.

LITHIC ANALYSIS

by

Richard A. Fox

The purpose of the lithic analysis was fourfold. First was the desire to determine the types of lithic materials present in the collection, including the point of origin of each. Second was the intent to analyze the chipped stone within gross lithic classes. Third was the desire to determine the within-site distribution of lithic debitage, particularly as it applied to density calculations. Fourth was the desire to assay the cultural implications derived from the analyses of the first three categories. The chipped stone category is considered first.

Chipped Stone

The chipped stone (Tables A2, A3, A4, A5 and A6) was classed into two gross categories, waste flakes and artifactual specimens. Artifacts found at the site were sparse and provide no indications regarding the temporal aspect. They are useful only in advancing hypotheses regarding their function and ultimately the functional nature of the site.

Artifacts

Artifacts included only a chert biface, and several glacial erratic stones that are presumed to have functioned as anvils and a hammerstone. These specimens were examined macroscopically. The biface was found on the site's surface during the 1978 survey. It is of a type ubiquitous to sites throughout a large geographical area. Artifacts of this type are generally considered to have been used in a variety of tasks, including cutting, scraping and butchering activities.

Associated with AC 1, AC 2 and AC 3 (unit N209E193), here considered on the basis of the faunal analysis (see Faunal Analysis section) as one activity area, contained four irregular-shaped granitic stones. These stones ranged in rough circumference from 40 to 60 cm. Because they are found in association with fractured bone and the hammerstone described below, they are interpreted as anvil stones used in the processing of rendering bone marrow accessible. It is difficult to say with certainty that they were used as anvils because of the nature of granitic stone in this region. They are coarse in texture and when fractured break irregularly, leaving little macroscopic evidence of alteration due to human activity. Granitic debris of this type is found at at least one other site where bone grease was rendered (Vehik 1977). This aspect of the

site is discussed under Granitic Debitage in this section.

Also associated with the activity area found in unit N209E193 was a hammerstone. This specimen is of a basaltic material and clearly exhibits flake scars at one end, and was likely used to direct blows against the bone found in association. The specimen measures 104.8 mm (long axis) by 88.3 mm (short axis) and weighs 606.5 g.

Waste Flakes

In the laboratory, waste flakes were classified according to material type and point of origin as well as flake class. A total of 171 waste flakes were collected from the 1 m^2 test units. The 11 waste flakes collected during the 1978 survey and the 1979 auger testing were not included in this analysis because it was clear that their inclusion would not appreciably alter the distributional and quantified data that follows. Table A7 identifies waste flakes by size grade according to provenience.

Flaking materials at the site fell into eight categories (Table 7). These materials included 1) quartz or quartzite, 2) jasper/chert, 3) various chalcedonies, 4) basaltic material, 5) silicified sediment, 6) porcellanite, 7) Knife River flint (KRF) and 8) other. The predominant material was in the jasper/chert category, making up 30.5% (n=52) of the collection. This was followed by KRF with 27% (n=46). Quartz or quartzite made up 20.5% (n=35), followed by chalcedonies (13.5%, n=23), basalt (7%, n=12) and one specimen each of silicified sediment, porcellanite, and siltstone.

Table 7. Summary data: total weights and counts of lithic debitage by flake class and material type for all 1 m^2 test units, all levels, including artifact concentrations. Count is listed first, then weight in grams (e.g., 5/27.2).

Material ↓ Flake Class →	Primary	Secondary	Tertiary	Totals
Quartzite or quartz	2/0.6	9/15.4	24/3.5	35/19.5
Jasper/chert	5/4.0	14/4.0	33/4.5	52/12.5
Various chalcedonies	2/0.6	6/8.6	15/1.8	23/11.0
Basaltic	3/10.5	4/3.6	5/6.1	12/20.2
Silicified sediment	-	-	1/0.1	1/0.1
Porcellanite	-	-	1/0.1	1/0.1
KRF	-	7/1.0	39/3.4	46/4.4
Other	1/7.6	-	-	1/7.6
Totals	13/23.3	40/32.6	118/19.5	171/75.4

These material types were further identified as to point of origin. It was concluded that three material type categories represented non-local materials. These included KRF, porcellanite and silicified sediment. Knife River flint is found only to the west of site 32BA418, primarily at the KRF quarries of Dunn and Mercer counties, North Dakota (Clayton et al. 1970). Silicified sediment is commonly found in southwestern North Dakota (Ahler 1977:137). Porcellanite is of coal burn origin and is commonly found in association with the Fort Union formation of western North Dakota and eastern Montana (Fredlund 1976). These materials are not found locally and must have been transported to the site area.

Local materials include the remainder of the material categories. They are presumably commonly available in the glacial till of the upland areas that surround the Sheyenne River valley.

In terms of the relative numbers of local versus non-local materials found at the site, local materials are clearly predominant. These materials make up 72% (n=123) of the collection. Non-local materials are in the minority (28%, n=48).

The flaking debitage was then analyzed according to flake class. Schneider (1972) notes that three classes can be assigned to flakes produced in the tool manufacturing/use/maintenance/discard trajectory. These are primary flakes (flakes with cortex completely covering the dorsal surface), secondary flakes (flakes with partial cortex remaining on the dorsal surface) and tertiary flakes (flakes with no cortex remaining on any surface). He further notes that the presence, absence or relative numbers of such classes at a site promote inferences regarding lithic technology at a site. Further, these inferences involve implications of trade, accessibility to raw material, length of occupation at a site and functional aspects.

Table 7 summarizes the material types according to flake class. It can be seen that the dominant flake class at the site is the tertiary class (69%, n=118), followed by the secondary class (23.4%, n=40) and the primary class (7.6%, n=13). Local materials clearly dominate in the tertiary flake class (45%, n=77) and secondary flake class (19%, n=33). The distribution is approximately equal in the primary flake class. These relationships may be skewed somewhat by combining residue generated by different processing methods. They are thought, however, to be useful at this general level of analysis. There

are no primary flakes of non-local materials. There are 14.6% of the non-local items with cortex and 34.1% of the local items with cortex.

Several inferences can be made from these data. Primary and secondary flakes are frequently products of the initial stages of tool manufacture. Tertiary flakes can be seen as evidence of the finishing stages of tool manufacture and/or tool maintenance. Some chipped stone tools were made at the site from locally available raw materials. Other tools were present in tool kits brought to the site. Some of these tools were used and resharpened, and perhaps modified and recycled for tasks associated with bison processing.

The presence of non-local materials at the site is not unexpected and is typical of many sites in eastern North Dakota. It is becoming clear that certain populations in this area included much of western North Dakota in their seasonal round. Some were also involved in extensive exchange systems. It is likely that the non-local materials were secured in either or both of these manners. It is also likely that these types of materials would have been present in the group at any given time and available for use in a variety of tasks. The fact that non-local material is in the minority at site 32BA418 suggests that local chippable stone resources served for more tasks and/or heavier use at the site.

Another aspect of the distribution of waste flake debitage is the low density found at the site. Density is discussed below, but it is apparent that the low density does not suggest a sustained occupation or intense chipped-stone-debris-producing activity at the site. The low density of chipped stone also suggests that tool manufacture was not a primary activity at the site.

Granitic Debitage

During the sorting phase, thousands of small fragments of granitic material were identified. These were not quantified, however their presence is intriquing. Vehik (1977:176) also found fractured granite at the Quast site on the James River. At one location at the site, fractured granite was found in association with bone fragments. She suggested that it was possible that the fractured granite resulted from the use of granitic anvil stones. Thousands of other fragments were found elsewhere at the site and suggested to be the result of using granite in pottery temper. Pottery was found at the Quast site, and unlike 32BA418, there is evidence of sustained occupation in the form of dwellings

and storage pits. It is likely that the fractured granitic remains at 32BA418 are largely the result of the use of granitic anvil stones. This evidence is consistent with the nature of the bone, the hammerstone, and the nature of the lithic debitage in indicating a primary site function of marrow extraction and preparation for grease extraction.

Density Computations

Two units (N200E189 and N209E193) were processed entirely by the 1/16 inch wet screen recovery method and provide the most detailed information on the site's assemblage of flaking debris. This allows density computations that can be used to predict the distribution of lithic debitage throughout the entire site. The site matrix excavated from these two units totaled 1.44 m^3. Taken collectively (n=127) the density computations indicate that the site matrix can be expected to yield approximately 88 lithic items/m^3 of excavation. All indications, however, suggest that these cultural items can be expected largely in the form of waste flakes and very rarely in the form of functional artifacts.

Another way of examining density relationships is by comparing density between these two units. At unit N200E189, only 12 waste flakes were found in .7 m^3 of processed site matrix. This suggests an expectation of only about 17 items/m^3. At unit N209E193, however, 115 waste flakes were recovered from .74 m^3 of processed matrix. This produces a density figure of nearly 155 items/m^3 which contrasts drastically to that of unit N200E189. The higher density at unit N209E193, which contained AC 1, AC 2 and AC 3, suggests that chipped stone tools are associated with ground stone hammers and anvils in bison processing activities at the site. At activity centers within the site, the waste flake density can be expected to be higher than elsewhere. At non-activity areas, the density can best be predicated on the basis of the computations from unit N200E189.

LAND SNAILS

by Bert Brine

This section documents the recovery, processing and analysis of land snails from excavated matrices at site 32BA418. The purpose of the analysis was to draw preliminary conclusions regarding the environmental conditions within the microhabitat of the site area.

Following the methodology of Jaenig (1971), 2 l matrix samples from 10 levels, five each from test units N209E193 and N200E189, were washed through 0.5 mm screens and the residue searched for snail shells. Eight species were tentatively identified from these 10 samples. These species include:

1. Vallonia gracilicosta
2. Gastrocopta armifera
3. G. holzingeri
4. Vertigo ovata
5. Succineidae sp.
6. Retinella sp.
7. Hawaiia minuscula
8. Zonitoides arboreus

Identification of the land snails is tentative because no comparisons have been done against type specimens, though two guide books were used [Burch (1962); Leonard (1959)]. A total of 190 land snails were identified within the eight categories. These are listed by level within excavation units and species in Tables 8 and 9.

Evans (1972:82) suggests that a minimum count of 100 individuals per sample is required in order to adequately address problems in environmental reconstruction. The processed samples from the site yielded an average count of only 9.5 snails per liter. On this basis, 10 one liter samples from each excavation unit at site 32BA418 would be required to make firm statements regarding past environmental conditions. Time and financial constraints precluded recovery, processing and identification of larger samples. It is felt, however, that some general preliminary statements regarding environmental conditions can be made.

A maximum of 35 snails were recovered from one sample with an overall average of 19 per sample. Preliminary inferences regarding frequency per sample and variety in species can be made from these data. First, the low frequencies

Table 8. Snails from 2 liter samples washed in 0.5 mm screens - unit N209E193.

Catalog #	cm Depth	Vallonia gracilicosta	Gastrocopta armifera	G. holzingeri	Vertigo ovata	Succineidae sp.	Retinella sp.	Hawaiia minuscula	Zoitoides arboreus	Total per Level
41	20-30		1			1				2
42	30-40	14	5			2	2	12		35
43	40-50	17	7							24
44	50-60	11	4			2	1	1		19
45	60-70	4	3	1		3		2		13
Total per species		46	20	1	0	8	3	15	0	93

Table 9. Snails from 2 liter samples washed in 0.5 mm screens - unit N200E189.

Catalog #	cm Depth	Vallonia gracilicosta	Gastrocopta armifera	G. holzingeri	Vertigo ovata	Succineidae sp.	Retinella sp.	Hawaiia minuscula	Zoitoides arboreus	Total per Level
46	20-30	2	1					5		8
47	30-40	6	3	2			1	3		15
48	40-50	3	3	2		1	1	21	1	32
49	50-60	10	2	2	1	2	1	12		30
50	60-70		3			2	1	6		12
Total per species		21	12	6	1	5	4	47	1	97

and minimum variety in species suggest that the site area represented only a marginal habitat through time for land snails. This marginal habitat (from a snail's perspective) was likely a relatively stable (environmentally through time), open grassland habitat, probably with minimum cover. Further, " . . . snails seem to be most prolific in moist and cool areas. They become least dense in dry, hot microhabitats" (Jaenig 1971:295). It seems, then, that the microhabitat of the site area may have been subjected to rather xeric conditions. An alternative explanation is that of poor preservation, but recovery of both minute, tightly wound varieties as well as larger, more loosely coiled species seem to preclude this hypothesis.

In sum, the sample is useful in making only general, preliminary observations on environmental conditions at the site. It is probable that the site area has long remained within open grasslands with minimum cover. The area was probably dominated by xeric conditions sufficient to limit the variety and population of land snails although periods of mesic conditions cannot be ruled out.

OTHER INFORMATION CATEGORIES

Two information categories recovered during laboratory processing were not analyzed due to time and financial constraints. These include insect parts and botanical remains. The botanical remains include seeds and rootlets. The rootlets are considered part of the modern botanical remains and are not pertinent in the archaeological sense. Seeds were also not analyzed, but from a macroscopic observation it is thought that they also are remains from the modern propogation of flora at the site. Both rootlets and seed remains were cataloged and curated in the same manner as all other materials in information categories. They remain available for additional study if so desired.

Insect parts nominally consist of the exo-skeletal remains of surface and earth dwelling insects such as beetles. These remains were also cataloged and curated in the standard manner. They remain available for further study; it is thought that they would be useful in addressing environmental conditions at the site. These remains are not numerous and would probably have to be augmented with additional specimens should further study be carried out.

DISCUSSION

Cultural Stratigraphy and Temporal Considerations

Cultural material in the form of bone and chipped stone was distributed in several units from the upper levels throughout to the sterile Pleistocene clay till. No discernible stratified cultural components were noticed that could account for this distribution. The problem, then, was to account for this distribution. As pointed out in the Geomorphology section, it is likely that the depositional nature of the site is largely responsible for this phenomenon and that the distribution is not the result of separate, sequential occupations within the site.

Generally, most of the site lies in a depositional setting that has experienced considerable instability from colluvial deposition and aeolian deposition and erosion. In the flatter, steppe-like areas it is possible that the effects of this process have not been as great as in more sloping areas. But the flat areas comprise only about 5% of the site area; the rest has been subjected to considerable amounts of mixing and reworking. Earthworm activity may also account for this phenomenon. The implications of these processes on the distribution of cultural material appear straightforward. Subsurface cultural materials in the sloping areas of the site can be expected to be in a disturbed context. Cultural materials in the flatter areas can be expected to have been buried in relatively intact deposits with less disturbance.

The depositional processes would likely have also obliterated any evidence of cultural stratigraphy had it existed at one time. It is, however, more likely that the processes have been ongoing since the cultural material was left behind and that the site represents a single component wherein most cultural material has been disturbed from original context and redistributed throughout the solum. In any case, the depositional processes preclude the resolution of this problem and the site matrix must be evaluated as a single component site wherein considerable natural disturbance has occurred.

A discussion of the nature of the cultural materials found in unit N209E193 can best serve to illustrate the foregoing discussion as well as offer some insight into the temporal aspect of the site. This unit was located on a steppe-like area. Cultural material in the form of waste flakes and bone were found distributed from the upper level downward to the vicinity of the sterile Pleistocene clay till. Resting at and near the contact of the aeolian/colluvial

and till units were the three artifact concentrations. Bone elements and pieces of bone elements were found in close association with hammer and anvil stones in these concentrations. It is not likely that the concentrations of bone and stone would have remained in close association had they been subjected to the active soil processes hypothesized in the Geomorphology section and reiterated here. It is hypothesized, then, that these concentrations are likely to be in an original or nearly original depositional context and have suffered little disturbance.

The vertical distribution of bone by size grade (Table 10) within the unit tends to confirm the hypothesis that the artifact concentrations may be close to their original context. Excluding the artifact concentrations themselves (CN's 20, 21, 22 and 25), it is apparent that the bulk of the bone, particularly in size grades G3 and G4 is concentrated in the 40 to 50 cm and the 50 to 60 cm levels (the area of the concentrations) and in the 10 cm above those levels (levels 4). At this point, the amount of bone begins to decrease (level 3, 20 to 30 cm) and becomes negligible in comparison at the upper level. It is suggested that the artifact concentrations were the source of these bone fragments and though located on a steppe-like area, these fragments were redistributed from the source by the active soil processes discussed herein.

Table 10. Count and weight of bone debris by size grade in unit N209E193. First figure is count; second is weight in grams. Grade 5 not quantified.

Level	CN	G1	G2	G3	G4	Total
level 1 (0-10 cm)	15	0	2/5.4	19/7.7	76/4.2	97/17.3
2 (10-20 cm)	16	1/13.1	3/4.3	26/9.6	279/11.3	309/38.3
3 (20-30 cm)	17	0	9/40.9	100/28.2	1051/40.3	1167/109.4
4 (30-40 cm)	18	1/25.0	14/36.0	232/72.6	1755/63.7	2002/197.3
5 (40-50 cm)	19	7/113.9	26/60.7	238/78.7	1964/77.4	2233/330.7
5 (AC 1)	20	0	3/6.6	18/3.8	68/3.0	89/13.4
6 (AC 1)	21	4/216.0	12/73.7	32/8.8	148/4.8	196/303.3
6 (AC 2)	22	7/225.7	19/81.0	23/9.5	51/1.5	100/317.7
6 (50-60 cm)	23	3/49.6	20/58.0	208/78.9	1394/49.4	1624/235.9
7 (60-70 cm)	24	0	10/29.0	50/14.1	319/11.2	378/54.3
7 (AC 3)	25	14/402.9	48/179.8	111/43.9	408/14.2	579/640.6
8 (70-74 cm)	26	0	0	7/2.1	40/1.5	47/3.6
Total		37/1046.2	166/575.2	1064/357.9	7559/298.0	8821/2277.3

It is likely that the small size of the bones made them more amenable to redistribution than the larger bone and lithic items found in close association.

More perplexing is the vertical distribution of waste flakes in the unit (Table 11). Nearly all of the waste flakes are found in the first five levels (0 to 50 cm); these materials are virtually absent in the levels that contain the artifact concentrations. This is particularly true in size grade G2. This tendency is also noticeable in the bone debris from unit N200E189 (Table 12). Some of the grade G4 material remains in the levels associated with the concentrations but most of it is distributed above. An explanation cannot be advanced for this phenomenon other than the concentration of waste flakes in the upper levels may represent a separate component. If so, there appears to be considerable disturbance in the upper levels of the site area.

Table 11. Count and weight of waste flakes by size grade in unit N209E193. First figure is count; second is weight in grams. Grade 5 not quantified.

Level	CX	G1	G2	G3	G4	Total
level 1 (0-10 cm)	15	0	1/3.4	17/13.1	18/2.9	36/19.4
2 (10-20 cm)	16	0	5/30.0	0	9/1.1	14/31.1
3 (20-30 cm)	17	0	0	2/2.4	15/.8	17/3.2
4 (30-40 cm)	18	0	1/2.5	0	14/1.3	15/3.8
5 (40-50 cm)	19	0	0	0	11/.5	11/.5
5 (AC 1)	20	0	0	0	0	0/0
6 (AC 1)	21	0	0	0	6/.6	6/.6
6 (AC 2)	22	0	0	0	0	0/0
6 (50-60 cm)	23	0	0	1/.4	7/.8	8/1.2
7 (60-70 cm)	24	0	0	0	7/.5	7/.5
7 (AC 3)	25	0	0	0	1/.1	1/.1
8 (70-74 cm)	26	0	0	0	0	0/0
Total		0	7/35.9	20/15.9	88/8.6	115/60.4

Table 12. Count and weight of bone debris by size grade in unit N200E189. First figure is count; second is weight in grams. Grade 5 not quantified.

Level	CX	G1	G2	G3	G4	Total
level 1 (0-10 cm)	33	0	0	3/.9	38/1.5	41/2.4
2 (10-20 cm)	34	0	0	8/1.7	147/6.0	155/7.7
3 (20-30 cm)	35	0	5/14.1	46/19.8	244/11.1	290/45.0
4 (30-40 cm)	36	1/21.5	6/38.8	53/18.8	329/12.5	395/170.7
5 (40-50 cm)	37	0	2/2.4	30/10.0	167/7.2	199/25.6
5 (AC 1)	38	3/111.5	0	1/.6	5/.1	9/112.2
6 (50-60 cm)	39	0	0	8/3.3	49/1.6	57/5.9
7 (60-70 cm)	40	0	2/.7	5/1.9	17/.7	24/3.3
Total		4/133.0	15/56.0	163/64.0	985/40.7	1167/293.7

Given the distribution of bone and the associational nature of the artifact concentrations in the unit N209E193 this is unlikely. In any case, a suggestion of a separate, younger component cannot be verified by the observation of distinct stratigraphic components. It is likely that the waste flakes have also been redistributed from the source near the concentrations but why it would not conform generally to the observations seen in the bone fragments is not understood.

If the hypothesis that the artifact concentrations are likely to be in or near their original depositional setting is valid, then it is probable that the occupation of the site corresponds in time with the onset of deposition of the aeolian/colluvial unit. As hypothesized earlier, it is probable that this event began in the late Holocene no later than 2000 years ago. Thus a maximum age for the site can be set at about 2000 years ago and in any case, is likely not to be younger than 1000 years old. Since that time it is probable that most of the buried cultural material has undergone disturbances as a result of the depositional processes active at the site. Much of the material has been redistributed above the original depositional context. This redistribution is likely to be quite apparent over at least 95% of the site. In the flatter, steppe-like areas redistribution of smaller cultural items can be expected; only the larger materials such as those in the artifact concentrations can be expected to be in situ or nearly in situ.

Site Function

Based upon the lithic and bone analysis it is hypothesized that a primary function of site 32BA418 centered around bone crushing for marrow extraction and preparation for grease extraction. Artifact concentrations AC 1, AC 2 and AC 3 (unit N209E193) clearly show an association of fragmented bone in association with a hammerstone and suspected anvil stones. The most prolific cultural material at the site is highly fragmented bone, a typical byproduct of marrow extraction. Lithic debitage in the form of waste flakes are either the product of non-patterned tool maintenance/manufacture or use.

It is suggested that the bone marrow extraction was carried out as one step in bone grease manufacture. Bone grease was used for a variety of things including the manufacture of pemmican, dried meat, butter or lard, or as a condiment for tanning hides (Vehik 1977:169-171).

Vehik (1977:172-173) presents a variety of traits common to bone grease manufacturing sites in the Northeastern Plains. The presence of many small fragments of

unburned animal bones, negative evidence of long bones, ribs and vertebrae (with the exception of articular ends), hammer and anvil stones, fractured stones and pottery.

Fire pits and pottery were not discovered in the excavations at site 32BA418. Many thousands of unburned, fragmented bones were present, some in association with the hammer and anvil stones. Fractured stone in the form of granitic fragments were also present. Evidence of longbones was found; however in all instances these bones had been subjected to fracturing. Vehik (1977:170) suggests that longbones were the most desirable for bone grease manufacturing and therefore should most likely be present in the form of unidentifiable fragments. On the other hand, she recognizes that some might escape fracturing and therefore, longbones could be expected at bone grease manufacturing sites. The presence of the longbone evidence would seem to conform to Vehik's expectations as do the ribs and vertebrae fragments (see Table Bone Analysis section for the propensity of these elements relative to other, less desirable elements present).

Vehik (1977:173) has hypothesized that there are two types of bone grease manufacturing sites that can be expected on the Northeastern Plains. These are the special purpose site and the settlement site. At the latter site type, one would expect to recover evidence of bone grease manufacture along with evidence of other activities. This seems to be the case at the Quast site, an occupation site on the James River where bone grease manufacture was carried out. At this site there is ample evidence of sustained occupation, including domiciles, fire pits, pottery and storage pits (Vehik 1977).

From a regional perspective, the Quast site is unlike site 32BA418 in many respects. Evidence of sustained occupation was not found at 32BA418 and fire pits and pottery were also not unearthed. In comparison, then, site 32BA418 cannot be considered to be a settlement area where bone grease manufacture was carried out. It is more likely that it is a special purpose site. Special purpose sites of this type should exhibit nothing more than the remains of bone grease manufacturing. Special purpose bone grease manufacture sites are seen as activity sites where bone grease manufacture took place within an animal processing context. In light of this, Vehik (1977:173) predicts that in addition to bone grease manufacture evidence, materials related to skinning, butchering and hide processing and tool byproducts should be expected at special purpose sites.

Flaking debris from chipped stone tool manufacture and use is present in moderate amounts. A similar situation also occurred at 32RM4, a site downstream from 32BA418 near Lison, ND. Thousands of bone fragments were found here as well as anvil stones, hammerstones and granitic fragments. Only a portion of the site was tested; the vast majority of the site lay outside of the impact area and it was not investigated. As at 32BA418, butchering and hide processing tool tools were absent at 32RM4 but a few longbone fragments were recovered. Fire and boiling pits were absent although a few pottery sherds were found. On the basis of this evidence it was concluded that in the area of the site tested, only bone smashing occurred. It was hypothesized that the grease rendering activities probably occurred in other portions of the site and that in these areas implements, evidence of fire and other data listed by Vehik as characteristic of special purpose bone grease manufacture sites could be found. On this basis the site was typed as a special purpose site.

From a regional comparative standpoint, it is felt that 32BA418 is not unlike the situation at 32RM4. At 32BA418 there is only evidence of bone smashing to make the bone amenable to marrow extraction and grease rendering. The absence of fire-cracked rock, surface hearths, boiling pits, and ceramics would suggest that activities subsequent to the bone smashing were carried out elsewhere. Just where they may have been conducted is problematical. It is not likely that this activity would have taken place within what we now recognize as the site boundaries. There is too little space remaining between the lake and the valley walls and testing would surely have revealed more positive evidence of tasks that follow bone smashing in the rendering process. More logical is the supposition that what we now know as 32BA418 represents only a portion of the site. If so, it is probable, given the restricted area in which the site now lies, that the site extended westerly toward the river prior to impoundment. On this basis, it is likely that much of the site has been inundated or eroded. There is clear evidence of such erosion (in the form of eroding bone detected during the 1978 and 1979 operations) in a cutbank at the lake's edge (Figure 21). It is hypothesized, then, that only portions of the site remain and that this portion can only be interpreted as an area where bone was smashed prior to bone marrow extraction and grease rendering. The actual rendering may have taken place in portions of the site that are no longer intact. If so, we cannot tell if other activities characteristic of the settlement site type were once extant. Thus, site 32BA418 must be

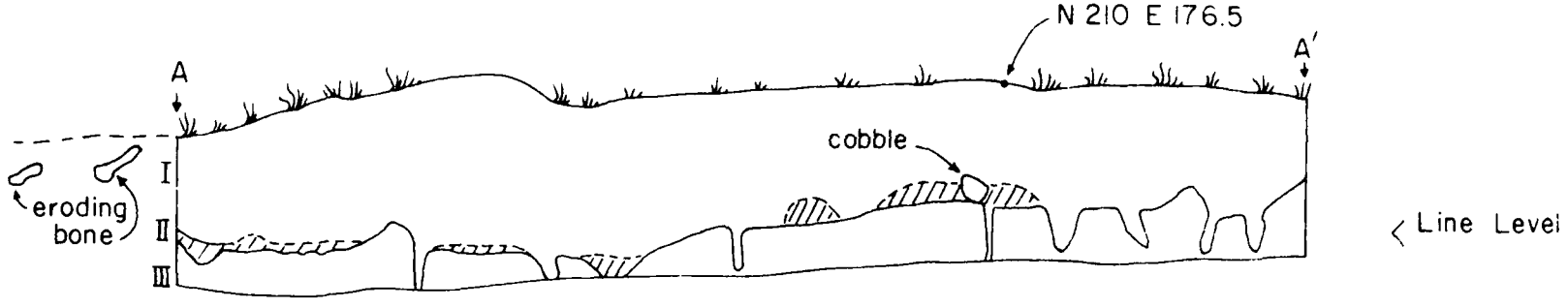


Figure 21. Profile of A - A' depicted in Figure 4. Note the eroding bone just to the left of the profile indicating that portions of the site have suffered from lacustrine erosion.

interpreted as a special purpose site where bone smashing prior to marrow extraction and grease rendering was conducted.

Cultural Affiliation

The lack of formally diagnostic materials precludes identification of cultural affiliation(s) at the site. Some general statements can be made, however. It is unlikely that the site is representative of the Plains Village cultural tradition, although bone grease manufacture is a characteristic common to this tradition. Evidence of Plains Village peoples outside of the Missouri trench is rare. Several sites on the James River west of the Sheyenne have been tentatively identified as Plains Village on the basis of house depressions and fortification ditches. Biesterfeldt is the only Plains Village site presently recorded in the Sheyenne Valley.

More commonly, sites in the Sheyenne Valley exhibit evidence of a Plains Woodland utilization of the region. Pottery is a Woodland trait; Woodland burial mounds in the Sheyenne Valley are well known.

Evidence of Plains Woodland occupation during the Early Woodland period is lacking in North Dakota. Only one Early Woodland site has been found in Minnesota. Occupation during the Middle and Late Woodland periods in the Sheyenne region of the Northeastern Plains, however, has been documented. These periods span the time period between about A.D. 1 and A.D. 1000. Many Woodland groups have been identified, including Sonota, Valley, Besant, Laurel and Blackduck. On the basis of the geomorphological data at the site, it was suggested that the occupation occurred sometime between 1000 and 2000 years ago. Given the evidence for Woodland in the Sheyenne region, the site is tentatively attributed to an unknown Woodland group during Middle or Late Woodland times.

Conclusions

It is concluded that 32BA418 represents a special purpose site where bone was smashed prior to bone marrow extraction and grease rendering processes. On this basis, it does not appear that the original hypothesis of a kill area, probably a bison jump, is valid. The occupation is probably representative of the Plains Woodland tradition, however this remains supposition. The events at this site probably occurred sometime between 1000 and 2000 years ago during Middle or Late Woodland times. Land snail analysis suggests that during this time the microenvironmental conditions were primarily xeric with open grasslands dominant.

Because of the fragmentary nature of the bone it is impossible to discuss butchering patterns. Elements from the axial skeleton are present along with elements from the skull and limbs. The kill location was on or near the site. Evidence for chipped stone tool manufacture and use in the artifact concentrations in association with fragmented bone, anvils, and a hammer stone indicates primary butchering in close proximity to the bone processing activity loci.

Later stages of bone grease manufacture were not carried out in the site area. They may have been carried out elsewhere, but this supposition remains to be validated. It is probable, however, that much of the site where other activities took place have been inundated and destroyed by impoundment of Lake Ashtabula.

It has been determined that cultural materials do exist at the site but as much as 95% of the site area has undergone disturbance by bioturbation and depositional processes. Thus, most of the cultural materials remaining in the subsurface can be expected to be removed from their original depositional context. On the basis of auger and unit testing, it is likely that the boundaries of the remaining portions of 32BA418 do not exceed those detected in the original investigations and depicted in Figure 4. The vertical distribution of cultural material extends from the surface to varying depths depending upon the location of the sterile Pleistocene clay till. In all instances, cultural material was found distributed to the contact between the solum and the clay till. Horizonation and cultural stratigraphy are not discernible in the solum. This is likely the result of the soil dynamics that have been active at the site. It is probable that the site contains only one component that has been highly disturbed by these dynamic soil processes.

RECOMMENDATIONS

by Michael L. Gregg

The SCOPE requires the following categories of information in this section: 1) evaluation of site significance with reference to the research goals of the study, 2) evaluation of site significance with reference to the National Register of Historic Places (NR) eligibility criteria, and 3) recommendations for the future disposition of the site with special reference to possible Corps impacts.

Site Significance with Reference to Research Goals

The research goals of this project have been stated in previous sections as purposes and hypotheses to be tested. The purposes and hypotheses are restated and capsulized results are presented.

Determine the Existence of Cultural Material and/or Features

Artifacts and ecofacts are present in the form of bone, stone tools, flaking debris, terrestrial gastropods, and seeds. Features are present in the form of artifact concentrations.

Determine the Conditions of Cultural Materials and/or Features with Respect to Disturbance

Some artifact concentrations are essentially undisturbed. Most other cultural remains appear to have undergone postdepositional disturbances through bioturbation and colluvial processes. Lake Ashtabula shoreline erosion appears to have eroded all but the eastern margin of the site.

Determine the Horizontal and Vertical Distribution of Cultural Remains

The horizontal distribution of cultural remains has been documented by surface collection and power augering; it is depicted in Figure 4. Test excavation units demonstrate the vertical distribution of prehistoric cultural remains throughout the solum. The vertical distribution of subsurface cultural material is from the upper level of each test unit (0 to 10 cm) through the entire solum to the contact of the solum with Pleistocene

clay till. Depth to till in the tested areas and in the cutbank exposure was no greater than 74 cm below present ground surface.

Determine the Cultural Affiliation of Cultural Remains

Geomorphological analyses suggest site occupation within the Woodland period. There are several named Woodland archaeological units with occupations known or anticipated within the study area (e.g., Sonota, Besant, Laural, Blackduck, and Sandy Lake). A ceramic assemblage is required to assess Woodland period cultural affiliation with reference to such named units. The site produced no ceramics. It is not possible to determine the cultural affiliation of cultural remains at the site with present research capabilities.

Site Function

It was hypothesized the site would yield evidence for bison kill and butchering activities. The excavated samples indicate on-site butchering and bone processing. A bison kill(s) was at or near the site as indicated by the occurrence of axial, appendicular, and cranial skeletal remains.

It had been hypothesized the site would yield evidence for only the initial stages of bison butchering. This hypothesis is rejected because of strong evidence for bone processing preparatory for rendering grease.

Adverse Impacts to the Site

It was hypothesized that 32BA418 represents a remnant of a once larger prehistoric cultural site. This hypothesis is confirmed by evidence for preparation of bone for grease rendering combined with lack of evidence for actual rendering (i.e., FCR, surface or prepared hearths, boiling pits, and/or ceramics). If rendering took place at the site, then the depositional context of the physical traces of rendering activities has been removed, probably by Lake Ashtabula shoreline erosion.

Site Significance with Reference to NR Eligibility Criteria

There are six integrity considerations for NR eligibility: integrity of location, design, setting, materials, workmanship, and association. Integrity is the quality or state of being complete, unbroken, whole, entire, and

unimpaired. For a prehistoric archaeological site to be evaluated as NR eligible, each of these integrity considerations must be either positive or not applicable. A prehistoric archaeological site must also have yielded, or be likely to yield, information important in prehistory.

32BA418 contains some cultural material with questionable integrity of location. Colluvial action on the valley wall has been the principal agent in soil formation on the site and it is likely that some cultural materials have been carried downslope and redeposited.

The integrity of the site setting is questionable. It is almost certain the site setting has been altered in at least two ways since the impoundment of Lake Ashtabula. First, the site area tested under this contract appears to be a remnant of a larger site. Second, fluvial and lacustrine erosion of the toe slope of the valley wall appears to have resulted in valley wall slumping which has modified the within-site microtopography.

Integrity of association is poor. Only in artifact concentrations is there horizontal association between several classes of cultural remains. There is, in general, a lack of cultural stratigraphy, even though prehistoric material remains are present from the surface down to glaciofluvial parent material (Pleistocene clay till). Both bioturbation and colluvial action appear to have been agents in disrupting the integrity of vertical association of cultural remains within the site.

Considerations of integrity of material, workmanship, and design are either positive or not applicable. The paucity of prepared tools and lack of preservation of perishables limits considerations of integrity of workmanship.

The final consideration in evaluating the site with reference to the NR eligibility criteria involves the site's information content. Has it yielded information important to prehistory? Does it have potential to yield further information important to prehistory? The assessment here is that 32BA418 has yielded important information relative to regional prehistory, but is not likely to yield any significant amount of additional information. This is a bison processing site on the eastern margin of the Sheyenne River valley. It was probably used during the Woodland period. Cultural affiliation with reference to named archaeological units is unknown. The resident group(s) interacted with groups in western North Dakota as evidenced by the significant occurrence of KRF in the chipped stone assemblage. The TRSS and porcellanite also indicate extra-regional interaction with groups to the west. Other important information

from the site is presented in earlier sections of this report. However, the site is evaluated here as having little potential to yield additional significant information. The site is evaluated as ineligible for listing on the NR because it lacks integrity of location, integrity of setting, and integrity of association.

Recommendations for Future Disposition of 32BA418

The St. Paul Corps should eliminate 32BA418 from consideration for any future protection. The site does present an opportunity, however, to monitor the effectiveness of riprap in preventing Ashtabula shoreline erosion of an archaeological site. The riprap at the western site margin has halted shoreline erosion for three years. Occasional monitoring should result in an objective assessment of the effectiveness of this form of ripraping in preventing destruction to cultural sites by shoreline erosion at Lake Ashtabula.

Because of the disturbances in various integrity categories at the site, it is felt that public use interpretive development is not warranted.

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AD-A140 690 PHASE II TESTING AT A PREHISTORIC SITE (32BA418) AT LAKE ASHTABULA (SHEYE.. (U) NORTH DAKOTA UNIV GRAND FORKS DEPT OF ANTHROPOLOGY AND ARCHAE.. R A FOX ET AL. 2/2

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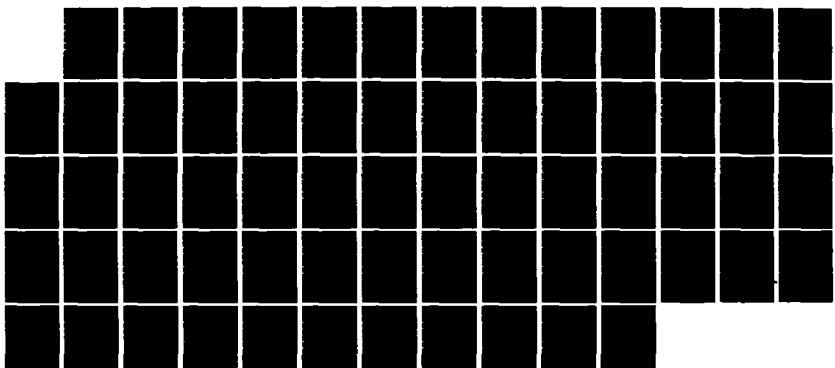
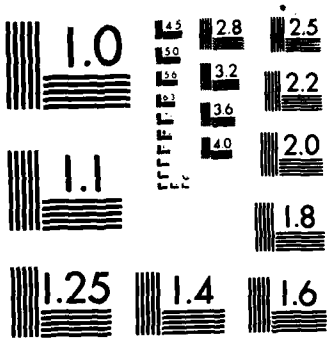




APPENDIX I

Bone and Lithic Debitage Quantification Tables

Table A1. Count and weight of bone debris by size grade according to 1 m^2 unit provenience. First figure is count; second is weight in grams. Grade 5 not quantified.

Unit/Level	CN	G1	G2	G3	G4	G5	Total
N164E166.5							
level 1 (0-10 cm)	2	0	0	0	0	-	0/0
2 (10-20 cm)	3	0	1/5.3	0	3/0.2	-	4/5.5
3 (20-30 cm)	4	0	0	3/1.7	2/0.4	-	5/2.1
4 (30-40 cm)	5	0	2/50.0	1/0.1	0	-	5/50.1
5 (40-50 cm)	6	0	0	1/0.1	3/0.6	-	4/0.7
6 (50-60 cm)	7	0	0	6/1.4	25/0.7	-	31/2.1
7 (60-70 cm)	8	0	0	6/2.0	15/0.8	-	21/2.8
8 (70-80 cm)	9	0	0	0	2/0.1	-	2/0.1
Total		0	3/55.3	17/5.3	50/2.8	-	72/63.4
N210E200							
level 1 (0-10 cm)	10	1/11.4	1/1.3	3/1.0	5/0.3	-	10/14.0
2 (10-20 cm)	11	0	1/1.1	5/3.2	12/0.9	-	18/5.2
3 (20-30 cm)	12	0	1/9.0	0	0	-	1/9.0
4 (30-40 cm)	13	0	0	0	0	-	0/0
5 (40-50 cm)	14	0	0	0	0	-	0/0
Total		1/11.4	3/11.4	8/4.2	17/1.2	-	29/28.2
N209E193							
level 1 (0-10 cm)	15	0	2/5.4	19/7.7	76/4.2	-	97/17.3
2 (10-20 cm)	16	1/13.1	3/4.3	26/9.6	279/11.3	-	309/38.3
3 (20-30 cm)	17	0	9/40.9	100/28.2	1051/40.3	-	1167/109.4
4 (30-40 cm)	18	1/25.0	14/36.0	232/72.6	1755/63.7	-	2002/197.3
5 (40-50 cm)	19	7/113.9	26/60.7	238/78.7	1964/77.4	-	2233/330.7
5 (AC 1)	20	0	3/6.6	18/3.8	68/3.0	-	89/13.4
6 (AC 1)	21	4/216.0	12/73.7	32/8.8	148/4.8	-	196/303.3
6 (AC 2)	22	7/225.7	19/81.0	23/9.5	51/1.5	-	100/317.7
6 (50-60 cm)	23	3/49.6	20/58.0	208/78.9	1394/49.4	-	1624/235.9
7 (60-70 cm)	24	0	10/29.0	50/14.1	319/11.2	-	378/54.3
7 (AC 3)	25	14/402.9	48/179.8	111/43.9	408/14.2	-	579/640.6
8 (70-74 cm)	26	0	0	7/2.1	40/1.5	-	47/3.6
Total		37/1046.2	166/575.2	1064/357.9	7559/298.0	-	8821/2277.3
N200E200							
level 1 (0-10 cm)	27	0	0	7/2.2	1/.1	-	8/2.3
2 (10-20 cm)	28	0	1/1.5	13/3.3	7/.7	-	21/5.5
3 (20-30 cm)	29	1/9.1	11/38.8	85/31.7	19/31.5	-	116/111.1
4 (30-40 cm)	30	4/255.1	20/77.2	70/17.1	389/14.5	-	482/363.9
5 (40-50 cm)	31	0	1/2.0	24/7.8	98/3.5	-	123/13.3
6 (50-60 cm)	32	0	0	2/.5	35/1.6	-	37/2.1
Total		5/264.2	33/119.5	201/62.6	549/51.9	-	787/498.2

Table continued on next page.

Table A1. continued.

Unit/Level	CN	G1	G2	G3	G4	G5	Total
N200E189							
level 1 (0-10 cm)	33	0	0	3/.9	38/1.5	-	41/2.4
2 (10-20 cm)	34	0	0	8/1.7	147/6.0	-	155/7.7
3 (20-30 cm)	35	0	5/14.1	46/19.8	244/11.1	-	290/45.0
4 (20-30 cm)	36	1/21.5	6/38.8	54/18.8	329/12.5	-	395/170.7
5 (40-50 cm)	37	0	2/2.4	40/16.0	157/7.2	-	199/25.6
5 (AC 1)	38	3/111.5	0	1/.6	4/.1	-	9/112.2
6 (50-60 cm)	39	0	0	8/4.3	49/1.6	-	57/5.9
7 (60-70 cm)	40	0	2/.7	3/1.9	17/.7	-	21/3.3
Total		4/133.0	15/56.0	163/64.0	985/40.7	-	1167/293.7

Table A2. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N210E200

Level: 1 **Depth:** 0-10 cm

Catalog number: 10

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	.2	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	.2	-	-	-	-	-
	count	-	-	1	-	-	-	-	-

Table A2. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418
Provenience: N210E200
Level: 2 **Depth:** 10-20 cm
Catalog number: 11
FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.3	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.3	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-

Table A2. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N210E200

Level: 4 **Depth:** 30-40 cm

Catalog number: 13

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	5.1	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 3	weight (gr)	0.7	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	0.7	-	5.1	-	-	-	-	-
	count	1	-	1	-	-	-	-	-

Table A2. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N210E200

Level: 4 Depth: 30-40 cm

Catalog number: 13

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	.3	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.3	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-

Table A3. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E200

Level: 4 **Depth:** 30-40 cm

Catalog number: 30

FLAKE CLASS: Primary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	.1	.1	-	-	-	-
	count	-	-	1	1	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	.1	.1	-	-	-	-
	count	-	-	1	1	-	-	-	-

Table A3. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E200

Level: 4 **Depth:** 30-40 cm

Catalog number: 30

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.3	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.3	-
	count	-	-	-	-	-	-	1	-

Table A3. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E200

Level: 5 **Depth:** 40-50 cm

Catalog number: 31

FLAKE CLASS: Primary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-

Table A3. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E200

Level: 5 **Depth:** 40-50 cm

Catalog number: 31

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-

Table A3. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E200

Level: 6 **Depth:** 50-60 cm

Catalog number: 32

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	-	-	-	-	-	.2	-
	count	1	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	-	-	-	-	-	.2	-
	count	1	-	-	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 3 **Depth:** 20-30 cm

Catalog number: 4

FLAKE CLASS: Primary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	2.3	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	2.3	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 4 **Depth:** 30-40 cm

Catalog number: 5

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 7 **Depth:** 60-70 cm

Catalog number: 8

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.2	-	-	-	-	-	-
	count	-	4	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.2	-	-	-	-	-	-
	count	-	4	-	-	-	-	-	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 5 **Depth:** 40-50 cm

Catalog number: 6

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight	5.2	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	5.2	-	-	-	-	-	.1	-
	count	1	-	-	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 8 **Depth:** 70-80 cm

Catalog number: 9

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.3	-	.1	.1	-	-	-	-
	count	4	-	1	1	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.3	-	.1	.1	-	-	-	-
	count	4	-	1	1	-	-	-	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 7 **Depth:** 60-70 cm

Catalog number: 8

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.1	.2	-	-	-	.2	-
	count	-	4	2	-	-	-	4	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.1	.2	-	-	-	.2	-
	count	-	4	2	-	-	-	4	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 6 **Depth:** 50-60 cm

Catalog number: 7

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	.1	-	-	-	.1	-
	count	-	-	1	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	.1	-	-	-	.1	-
	count	-	-	1	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 5 **Depth:** 40-50 cm

Catalog number: 6

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	.5	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.2	-
	count	-	-	-	-	-	-	2	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.5	-	-	-	-	-	.2	-
	count	1	-	-	-	-	-	2	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 4 **Depth:** 30-40 cm

Catalog number: 5

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 3 **Depth:** 20-30 cm

Catalog number: 4

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	.2	-
	count	-	-	-	-	-	-	1	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.2	-
	count	-	-	-	-	-	-	1	-

Table A4. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N164E166.5

Level: 2 **Depth:** 10-20 cm

Catalog number: 3

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	.5	-
	count	-	-	-	-	-	-	2	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.5	-
	count	-	-	-	-	-	-	2	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 1 **Depth:** 0-10 cm

Catalog number: 15

FLAKE CLASS: Primary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	**weight (gr)**	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	**weight (gr)**	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	**weight (gr)**	.3	1.6	.5	-	-	-	-	-
	count	1	3	1	-	-	-	-	-
Grade 4	**weight (gr)**	.3	-	-	.2	-	-	-	-
	count	1	-	-	1	-	-	-	-
Grade 5	**weight (gr)**	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	**weight (gr)**	.6	1.6	.5	.2	-	-	-	-
	count	2	3	1	1	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 1 **Depth:** 0-10 cm

Catalog number: 15

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	1.5	.9	.5	3.1	-	-	-	-
	count	1	2	1	3	-	-	-	-
Grade 4	weight (gr)	-	.7	.2	-	-	-	-	-
	count	-	4	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	1.5	1.6	.7	3.1	-	-	-	-
	count	1	6	2	3	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 1 **Depth:** 0-10 cm

Catalog number: 15

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	3.4	-	-	-	-
	count	-	-	-	1	-	-	-	-
Grade 3	weight (gr)	.9	1.3	-	2.5	-	-	-	-
	count	1	2	-	2	-	-	-	-
Grade 4	weight (gr)	.4	1.1	-	-	-	-	-	-
	count	4	7	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	1.3	2.4	-	5.9	-	-	-	-
	count	5	9	-	3	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 2 **Depth:** 10-20 cm

Catalog number: 16

FLAKE CLASS: Primary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	10.2	-	-	-	7.6*
	count	-	-	-	1	-	-	-	1
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	10.2	-	-	-	7.6
	count	-	-	-	1	-	-	-	1

* Siltstone

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 2 **Depth:** 10-20 cm

Catalog number: 16

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	7.0	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	7.0	.1	-	-	-	-	-	-
	count	1	1	-	-	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 2 **Depth:** 10-20 cm

Catalog number: 16

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.2	.4	.1	-	-	-	-	-
	count	4	3	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.2	.4	.1	-	-	-	-	-
	count	4	3	1	-	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 3 **Depth:** 20-30 cm

Catalog number: 17

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	1.9	-	.5	-	-	-	-
	count	-	1	-	1	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	1.9	-	.5	-	-	.1	-
	count	-	1	-	1	-	-	1	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 3 **Depth:** 20-30 cm

Catalog number: 17

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.5	.1	-	-	-	.4	-
	count	-	8	1	-	-	-	5	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.5	.1	-	-	-	.4	-
	count	-	8	1	-	-	-	5	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 4 **Depth:** 30-40 cm

Catalog number: 18

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	2.5	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	.1	-	-	-	-	.4	-
	count	2	1	-	-	-	-	2	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	.1	2.5	-	-	-	.4	-
	count	2	1	1	-	-	-	2	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 4 **Depth:** 30-40 cm

Catalog number: 18

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.2	-	.1	-	-	.1	.2	-
	count	2	-	3	-	-	1	3	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.2	-	.1	-	-	.1	.2	-
	count	2	-	3	-	-	1	3	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 5 **Depth:** 40-50 cm

Catalog number: Secondary

FLAKE CLASS:

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	-	-	-	-	-	.1	-
	count	1	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	-	-	-	-	-	.1	-
	count	1	-	-	-	-	-	1	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 5 **Depth:** 40-50 cm

Catalog number: 19

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	.1	-	-	-	-	.1	-
	count	2	2	-	-	-	-	5	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	.1	-	-	-	-	.1	-
	count	2	2	-	-	-	-	5	-

Table A5. **Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).**

Site: 32BA418

Provenience: N209E193

Level: 6 **Depth:** 50-60 cm

Catalog number: 21 (artifact concentration #1)

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	.1	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	.1	-	-	-	-	-
	count	-	-	1	-	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418
Provenience: N209E193
Level: 6 **Depth:** 50-60 cm
Catalog number: 21 (artifact concentration #1)
FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.2	.1	.1	-	-	.1	-
	count	-	2	1	1	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.2	.1	.1	-	-	.1	-
	count	-	2	1	1	-	-	1	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 6 **Depth:** 50-60 cm

Catalog number: 23

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	.4	-	-	-	-	-	-	-
	count	1	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	-	.1	-	-	-	-	-
	count	2	-	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.5	-	.1	-	-	-	-	-
	count	3	-	1	-	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 6 Depth: 50-60 cm

Catalog number: 23

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	-	-	-	-	-	.4	-
	count	1	-	-	-	-	-	3	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	-	-	-	-	-	.4	-
	count	1	-	-	-	-	-	3	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 7 **Depth:** 60-70 cm

Catalog number: 24

FLAKE CLASS: Secondary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	.1	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	.1	-	-	-	-	-
	count	-	-	1	-	-	-	-	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418
Provenience: N209E193
Level: 7 Depth: 60-70 cm
Catalog number: 24
FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	.1	-	.4	-
	count	-	-	-	-	1	-	5	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	.1	-	.4	-
	count	-	-	-	-	1	-	5	-

Table A5. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N209E193

Level: 7 Depth: 60-70 cm

Catalog number: 25 (artifact concentration #3)

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	1	-

Table A6. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E189

Level: 3 **Depth:** 20-30 cm

Catalog number: 35

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	.6	-	-	-	-	-
	count	-	-	1	-	-	-	-	-
Grade 4	weight (gr)	.3	.4	.1	-	-	-	-	-
	count	2	3	2	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.3	.4	.7	-	-	-	-	-
	count	2	3	3	-	-	-	-	-

Table A6. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E189

Level: 4 **Depth:** 30-40 cm

Catalog number: 36

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	.1	-	-	-	-	-	-
	count	-	1	-	-	-	-	-	-

Table A6. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418
Provenience: N200E189
Level: 5 **Depth:** 40-50 cm
Catalog number: 37
FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	3	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	-	-	-	-	-	-	.1	-
	count	-	-	-	-	-	-	3	-

Table A6. Distribution of lithic debitage by provenience, flake class, material type and size grade (except granitic).

Site: 32BA418

Provenience: N200E189

Level: 7 **Depth:** 60-70 cm

Catalog number: 40

FLAKE CLASS: Tertiary

		Quartz or quartzite	Jasper/ chert	Various chalcedonies	Basaltic	Silicified sediment	Porcellanite	KRF	Other
Grade 1	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 2	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 3	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Grade 4	weight (gr)	.1	-	.1	-	-	-	.1	-
	count	1	-	1	-	-	-	1	-
Grade 5	weight (gr)	-	-	-	-	-	-	-	-
	count	-	-	-	-	-	-	-	-
Totals	weight (gr)	.1	-	.1	-	-	-	.1	-
	count	1	-	1	-	-	-	1	-

Table A7. Count and weight of waste flakes by size grade according to 1 m^2 unit provenience. First figure is count; second is weight in grams. Grade 5 not quantified.

Unit/Level	CN	G1	G2	G3	G4	G5	Total
N164E166.5							
level 1 (0-10 cm)	2	0	0	0	0	-	0/0
2 (10-20 cm)	3	0	0	2/.5	0	-	2/.5
3 (20-30 cm)	4	0	0	3/3.1	0	-	3/3.1
4 (30-40 cm)	5	0	0	0	2/.2		2/.2
5 (40-50 cm)	6	0	1/5.2	1/.3	2/.5	-	4/6.0
6 (50-60 cm)	7	0	0	0	3/.1	-	3/.1
7 (60-70 cm)	8	1/43.4	0	0	16/.6	-	17/44.0
8 (70-80 cm)	9	0	0	0	8/.5	-	8/.5
Total		1/43.4	1/5.2	6/3.9	31/1.9		39/54.4
N210E200							
level 1 (0-10 cm)	10	0	0	0	1/.2	-	1/.2
2 (10-20 cm)	11	0	0	0	1/.3	-	1/.3
3 (20-30 cm)	12	0	0	0	0	-	0/0
4 (30-40 cm)	13	0	1/5.1	2/1.0	0	-	3/6.1
5 (40-50 cm)	14	0	0	0	0	-	0/0
Total		0	1/5.1	2/1.0	2/.5		5/6.6
N209E193							
level 1 (0-10 cm)	15	0	1/3.4	17/13.1	18/2.9	-	36/19.4
2 (10-20 cm)	16	0	5/30.0	0	9/1.1	-	14/31.1
3 (20-30 cm)	17	0	0	2/2.4	15/.8	-	17/3.2
4 (30-40 cm)	18	0	1/2.5	0	14/1.3	-	15/3.8
5 (40-50 cm)	19	0	0	0	11/.5	-	11/.5
5 (AC 1)	20	0	0	0	0	-	0/0
6 (AC 1)	21	0	0	0	6/.6	-	6/.6
6 (AC 2)	22	0	0	0	0	-	0/0
6 (50-60 cm)	23	0	0	1/.4	7/.8	-	8/1.2
7 (60-70 cm)	24	0	0	0	7/.5	-	7/.5
7 (AC 3)	25	0	0	0	1/.1	-	1/.1
8 (70-74 cm)	26	0	0	0	0	-	0/0
Total		0	7/35.9	20/15.9	88/8.6		115/60.4
N200E200							
level 1 (0-10 cm)	27	0	0	0	0	-	0/0
2 (10-20 cm)	28	0	0	0	0	-	0/0
3 (20-30 cm)	29	0	0	0	0	-	0/0
4 (30-40 cm)	30	0	0	0	3/.5	-	3/.5
5 (40-50 cm)	31	0	0	0	2/.1	-	2/.1
6 (50-60 cm)	32	0	0	0	2/.3	-	2/.3
Total		0	0	0	7/.9		7/.9

Table continued on next page.

Table A7. continued.

Unit/Level	CN	G1	G2	G3	G4	G5	Total
N200E189							
level 1 (0-10 cm)	33	0	0	0	0	-	0/0
2 (10-20 cm)	34	0	0	0	0	-	0/0
3 (20-30 cm)	35	0	0	1/.6	7/.9	-	8/1.5
4 (30-40 cm)	36	0	0	0	1/.1	-	1/.1
5 (40-50 cm)	37	0	0	0	3/.1	-	3/.1
5 (AC 1)	38	0	0	0	0	-	0/0
6 (50-60 cm)	39	0	0	0	0	-	0/0
7 (60-70 cm)	40	0	0	0	0	-	0/0
Total		0	0	1/.6	11/1.1		12/1.7

APPENDIX II

Site Form and Scope of Work

NORTH DAKOTA CULTURAL RESOURCES SURVEY

Base Data Form

1. **County** BARNES **2. Site Number** 32BA418
3. **Site Name (s)** OLD STOVE SITE
4. **Type of Resource:** A. Archaeological X Historical__ Architectural__ Paleontological__
   B. District__ Site X Building__ Structure__ Object__
5. **Map Reference:** USGS 7.5 MIN SERIES "SIBLEY QUAD" 1967
6. **Location:** NE¼ of SE¼ of SW¼ of NW¼ of **Sec.** 25 **T** 143 **N / R** 58 **W**
   Plat: [illegible] **Block**____ **Lot**____
   UTMG: A. [illegible] B.____
   C.____ D.____
7. **Access:** 3/4 MILE E OF SIBLEY DROSSING, 4 MILES S, 2½ MILES W, 7/8 MILE N, AND PROCEED ON FOOT 1 MILE NE ALONG E SHORE OF LAKE ASHTABULA. SITE IS ON BEACH AND BONE IS IN CUTBANK 50 METERS DUE NE.
8. **A. General description of site:** BASE OF SLOPE ERODING INTO LAKE ASHTABULA. SANDY BEACH WHERE BIFACE WAS FOUND. MOST OF DISARTICULATED SKELETON OF BISON ERODING OUT OF CUTBANK 50 METERS NE OF WHERE BIFACE WAS LOCATED

   B. Condition of site: ERODING INTO LAKE ASHTABULA
9. **Owner's name/address:** GORDEN E. MEYER--OWNS UPLANDS
10. **Occupant's name/address:** U.S. ARMY CORPS OF ENGINEERS OWNS SHORELINE
11. **Historic Register value:** Nat.__ State__ Undt. X None__ On Reg.__ In District__ District__
12. **Open to public:** Yes X No__ **13. Preservation Underway:** Yes__ No X
14. **Endangered by:** EROSION, RIP RAP, FUTURE RAISES IN POOL ELEVATION
15. **Survey Project: Title** LAKE ASHTABULA SURVEY 1978-79 **Director** RICHARD A. FOX
    Other surveys in which included NONE KNOWN
16. **Recommendations:** See final report for items #11 & 16
17. **Environment: Elevation** 1266-1275' **Nearest Water: Type** LAKE
    Name L. ASHTABULA **Distance** CONTACT **Direction** W
    Soil conditions: DRY, CRUMBLY
    Soil Texture: SANDY BEACH. CLAY BANK WITH 1½ FT OF BLACK LOAM ON SURFACE.

Site Number 32BA418

17. Environment, Cont.

Ground Cover: PASTURE AND GRASS COVER. SAND ON BEACH

Terrain: MODERATE SLOPE E OF CUTBANK. BEACH IS APPROX. 15 FT WIDE.

18. Local contact person or organization: AUDREY THOMAS, US CORPS OF ENGINEERS, ST.PAUL,MN

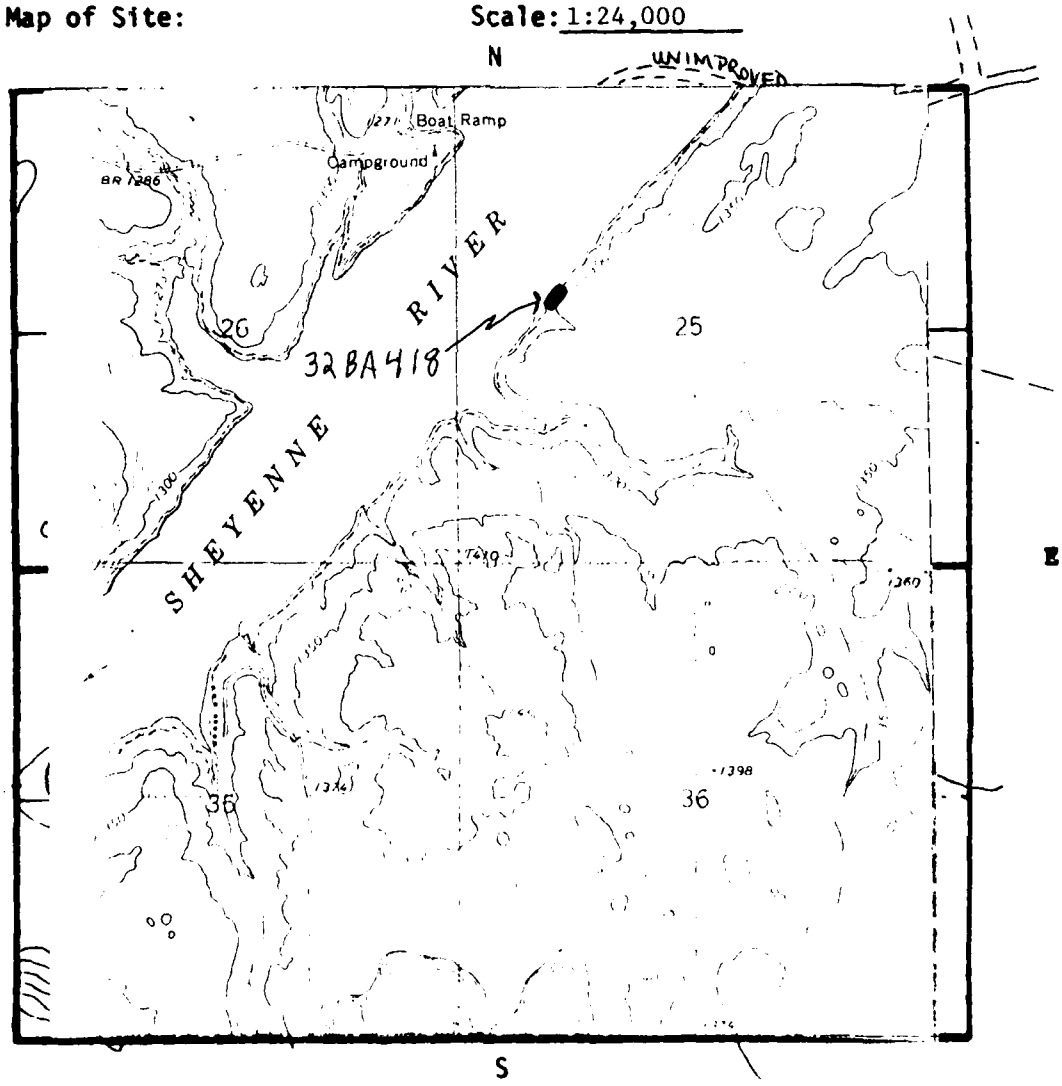
19. Photos: No__ B/W X Color__ Prints__ Slides X Comments/ID code_____

One each of site overview

Negatives stored at: Anthro/Arch - UND

In space below attach and identify a picture or contact print of the site.

20. Sketch Map of Site: Scale: 1:24,000



Recorded by: R. FAFLAK Date 1 NOV. 1978

Revised by: _____ Date _____

21. **Preliminary cultural assessment:** UNKNOWN

22. **Site Type:** UNKNOWN

23. **Collection: Time spent collecting:** 1 man ½ hr(s). **Materials collected:**
1 BIFACE (KNIFE) PATINATED BROWN CHALCEDONY (KRF OR PETRIFIED WOOD).

Artifacts stored at: UND DEPT. ANTHROPOLOGY/ARCHAEOLOGY
Materials observed, but not collected: BISON BONE--IDENTIFICATION AS BISON IS A FIELD OBSERVATION; THEY COULD BE Bos sp.
Collections observed: Material NONE
Owner/address: N/A

24. **Site size: (Meters, feet-yards, acres)** 50 METERS ALONG BEACH
How determined: Paced__ Eyeballed_X Taped__ Other__

25. **Surface Features Observed:** NONE

26. **Comments/References:** BONE PROTRUDING FROM CUTBANK APPROX. SURFACE TO 1 FT DEPTH IN AREA APPROX. 10 FT LONG. BONE IN SITU MAY INDICATE THE EXISTENCE OF UNDISTURBED SUBSURFACE DEPOSITS. UNDOUBTEDLY MUCH OF THE SITE HAS ERODED AWAY OR IS INUNDATED.

Final Report: 1978-1979 CULTURAL RESOURCE INVESTIGATIONS ALONG THE MIDDLE SHEYENNE RIVER VALLEY INCLUDING LAKE ASHTABULA AND A PORTION OF THE SHEYENNE RIVER (FOX 1980)

Recorded by: R. FAFLAK **Date** 1 NOV. 1978

SCOPE OF WORK
CULTURAL RESOURCES INVESTIGATION
AT LAKE ASHTABULA

1.00 INTRODUCTION

1.01 The Contractor will undertake a cultural resources investigation of sites at Lake Ashtabula, Barnes County, North Dakota.

1.02 This cultural resources inventory is being done in partial fulfillment of the obligations of the St. Paul District regarding cultural resources, as set forth in the Historic Preservation Act of 1966 (Public Law (P.L.) 89-665), the National Environmental Policy Act of 1969 (P.L. 91-190), Executive Order (E.O) 11593 for the Protection and Enhancement of the Cultural Environment (Federal Register, 13 May 1971), the Archaeological Conservation Act of 1974 (P.L. 93-291), the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR Part 800), the Department of the Interior guidelines concerning cultural resources (36 CFR Part 60), and Corps of Engineers regulations (ER 1105-2-460) "Identification and Administration of Cultural Resources" (Federal Register, 3 April 1978).

1.03 The above laws establish the importance of Federal leadership, through the various responsible agencies, in locating and preserving cultural resources within project areas. Specific steps to comply with these laws, particularly as directed in P.L. 93-291 and E.O. 11593, are being taken by the Corps "...to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures, and objects of historical, architectural, or archaeological significance." A part of that responsibility is to locate, inventory, and nominate to the Secretary of the Interior all such sites in the project area that appear to qualify for listing on the National Register of Historic Places.

1.04 The Executive Order further directs Federal agencies "...to assure that any federally owned property that might qualify for nomination is not inadvertently transferred, sold, demolished or substantially altered." In addition, the Corps is directed to administer its policies, plans and programs in such a way that federally and non-federally owned sites, structures, and objects of historical, architectural, or archaeological significance are preserved and maintained for the inspiration and benefit of the people.

1.05 This cultural resources investigation will serve several purposes. The report will be a planning tool to aid the Corps in meeting its obligations to preserve and protect our cultural heritage. It will be a comprehensive, scholarly document that not only partially fulfills federally mandated legal requirements but also serves as a scientific reference for future professional studies. It will identify sites which may require additional investigations and which may have potential for public-use development. Therefore, the report must be analytical, not just descriptive.

2.00 PROJECT DESCRIPTION

2.01 Lake Ashtabula and Baldhill Dam, authorized by the Flood Control Act of 1944, is a multi-purpose project operated to provide flood control, water supply, and recreational opportunities.

2.02 A cultural resource literature search and records review and Phase I survey of Lake Ashtabula conducted in 1980 located 46 sites. The results of this survey are detailed in a report entitled 1978-1979 Cultural Resource Investigations Along the Middle Sheyenne River Valley Including Lake Ashtabula and a Portion of the Sheyenne River. This report was prepared by the University of North Dakota under contract with the St. Paul District, Corps of Engineers.

2.03 One of the sites located during this survey was 32 BA 418. This site is located in the NE¼, SE¼, SW¼, NW¼, Sec. 25, T. 143 N., R. 58 W. It is tentatively identified as a possible butchering site based on the recovery of a one biface and the large abundance of bone which exhibits butchering evidence.

2.04 Another site located during this survey was 32 BA 415. This site is located in the NW¼, NE¼, NW¼, SE¼, Sec. 4, T. 142 N., R. 58 W. This site is a lithic scatter located in a relatively undisturbed field. The materials recovered were all picked up from rodent backfill and included one partial projectile point base, flakes, and small bone fragments.

3.00 DEFINITIONS

3.01 For the purpose of this study, the cultural resources investigation will involve Phase II testing. A literature and records search and review, and Phase I survey will not be conducted at this time.

3.02 "Cultural resources" are defined to include any building, site, district, structure, object, data, or other material relating to the history, architecture, archaeology, or culture of an area.

3.03 "Literature and records search" is defined as a search for and examination of written reports, books, articles, files, records, etc., published and unpublished (found in private, local, State, and Federal depositories), which are pertinent to the cultural resources investigation to be carried out for a particular project. The purposes of the literature and records search are: to familiarize the Contractor with the culture history of the study area and past investigations which have been carried out in the area; to document the location and condition of known sites which may exist within the project area, the extent of past work undertaken at the site, and any other information which may be relevant in assessing the significance of the site; and to provide this information in a summarized form to the agency requesting the search. Although existing data may be extensive, the literature and records search should be as comprehensive as possible in providing a usable body of data for the purposes outlined above.

3.04 "Literature and records review" is defined as the review and evaluation of the pertinent literature and records examined under section 3.03. The purpose of the literature and records review is to provide the sponsoring agency with the Contractor's professional opinion as to the quality, nature, and extent of the sources identified in the literature and records search (see section 5.11).

3.05 "Phase I cultural resources survey" is defined as an intensive, on-the-ground survey and testing of an area in order to determine the number and extent of the archaeological, historic, and architectural resources present and their relationship to all the project alternatives and features. A Phase I cultural resources survey will result in data adequate to assess the general nature of all sites present; a recommendation for additional testing of those resources which, in the professional opinion of the Contractor, may provide important cultural and scientific information; and detailed time and cost estimates for Phase II testing.

3.06 "Phase II testing" is defined as the intensive testing of those sites which may provide important cultural and scientific information. Phase II testing will result in data adequate to determine the eligibility of the resources for inclusion on the National Register of Historic Places, a plan for the satisfactory mitigation of eligible sites which will be directly or indirectly impacted, and detailed time and cost estimates for mitigation.

4.00 SURVEY AND TESTING SPECIFICATIONS

4.01 Phase II testing will be undertaken at site 32 BA 418. If time and funding allows, Phase II testing will also be undertaken at site 32 BA 415.

5.00 PERFORMANCE SPECIFICATIONS

5.01 The Contractor will utilize a systematic, interdisciplinary approach in conducting the study. The Contractor will provide specialized knowledge and skills during the course of the study to include expertise in archeology, and other social and natural sciences as required.

5.02 The extent and character of the work to be accomplished by the Contractor will be subject to the general supervision, direction, control, review and approval of the Contracting Officer.

5.03 Techniques and methodologies that the Contractor uses during the investigation shall be representative of the current state of knowledge for their respective disciplines.

5.04 The Contractor shall keep standard records which shall include, but not be limited to, field notebooks, site survey forms, field maps, and photographs.

5.05 The recommended professional treatment of recovered materials is curation and storage of the artifacts at an institution that can properly insure their preservation and that will make them available for research and public view. If such materials are not in Federal ownership, the consent of the owner must be obtained, in accordance with applicable law, concerning the disposition of the materials after completion of the report. The Contractor will be responsible for making curatorial arrangements for any collections which are obtained. Such arrangements must be coordinated with the appropriate officials of North Dakota and approved by the Contracting Officer.

5.06 When sites are not wholly contained within the right-of-way, the Contractor shall survey an area outside the right-of-way limits large enough to include the entire site within the survey area. This procedure shall be done in an effort to delineate site boundaries and to determine the degree to which the site will be impacted.

5.07 The Contractor shall provide all materials and equipment as may be necessary to expeditiously perform those services required of the study.

5.08 Should it become necessary in the performance of the work and services, the Contractor shall, at no cost to the Government, secure the rights of ingress and egress on properties not owned or controlled by the Government. The Contractor shall secure the consent of the owner, his representative, or agent, in writing prior to effecting entry on such property. If requested, a letter of introduction, signed by the District Engineer, can be provided to explain the project purposes and request the cooperation of landowners. Where a landowner denies permission for survey, the Contractor shall immediately notify the Contracting Officer and shall describe the extent of the property to be excluded from the survey.

5.09 The Contractor will test the site areas sufficiently to determine the existence of cultural materials and/or features, their condition (in situ or disturbed), the horizontal and vertical distribution of the remains, and, if possible, the cultural affiliation of the site(s).

5.10 Recommendations on the significance of the sites according to the National Register of Historic Places criteria will be included in the final report. These recommendations will include a detailed justification for the significance or non-significance of the site(s), including what research questions the sites can answer.

5.11 The Contractor will recommend appropriate mitigative measures, including time and cost estimates, where warranted.

5.12 All testing will employ standard archaeological techniques, including formal test pits. All material will be screened through ¼-inch mesh screen.

5.13 The tested areas will be returned as closely as practical to pre-survey conditions by the Contractor.

6.00 GENERAL REPORT REQUIREMENTS

6.01 The Contractor will submit the following types of reports, which are described in this section and in section 9.00: field report, field notes, draft contract report, final contract report, and a completed National Register form(s), if appropriate.

6.02 The Contractor's technical report shall include, but shall not be limited to, the following sections as appropriate to the study.

a. Title Page: The title page shall provide the following information: the type of investigation undertaken; the cultural resources which were assessed (archeological, historical, and architectural); the project name and location (county and State); the date of the report; the Contractor's name; the contract number; the name of the author(s) and/or Principal Investigator; the signature of the Principal Investigator; and the agency for which the report is being prepared.

b. Abstract: An abstract of findings, conclusions, and recommendations. This should not be an annotation.

c. Management Summary: This section will include a concise summary of the study, which will contain all essential data for using the document in the Corps of Engineers management of the project. This information will minimally include: why the work was undertaken and who the sponsor is, a brief summary of the scope of work and budget, summary of the study (field work; lab analysis), study limitations, study results, significance, recommendations and the repository of all pertinent records and artifacts.

d. Table of Contents

e. List of Figures

f. List of Plates

g. Introduction: This section shall identify the sponsor (Corps of Engineers) and the sponsor's reason for the study; an overview of the testing project, with the site(s) located on USGS quad maps. This section should also provide an overview of the archeological study to be undertaken; define the location and boundaries of the study area (with regional and area-specific maps); define the study area within its cultural, regional, and environmental context; reference the scope of work; identify the institute that did the work, the number of people involved in the study, the number of person-days/hours utilized during the study; identify the dates when the various types of work were completed; identify the repository of records and artifacts; and provide a brief overview or outline of how the study report will proceed and an overview of the major goals that the study/study report will accomplish.

h. Previous Archeological and Historical Studies: This section shall provide a summary and evaluation of previous archeological and historical studies of the project area and region, including the researchers, date, extent, adequacy of the past work, study results, and cultural/behavioral inferences derived from the research.

i. Environmental Background: This section shall include a description of the study area and regional environment, including the following categories: geology, vegetation, fauna, climate, topography, physiography, and soils, with reference to prehistoric, historic, ethnographic, and contemporary periods. Any information available on the relationship of the environmental setting to the area's prehistory and history shall be included. This section shall be of a length commensurate with other report sections.

j. Theoretical and Methodological Overview: This section shall include a description or statement of the goals of the Corps of Engineers and the study researcher, the theoretical and methodological orientation of the study, and the research strategies that were applied in achieving the stated goals.

k. Field Methods: This section will describe the specific archeological activities undertaken to achieve the stated theoretical and methodological goals. The section shall include all field methods, techniques, strategies, and rationale or justification for specific methods or decisions. The description of the field methods shall minimally include: a description of field conditions, topographic/physiographic features, vegetation conditions, soil types, stratigraphy, testing results with all appropriate testing forms to be included as an appendix, and the rationale for eliminating uninvestigated areas. Testing methods shall include descriptions of test units (size, intervals, stratigraphy, depth) and the rationale behind their placement.

l. Analysis: This section will describe and provide the rationale for the specific analytic methods and techniques used, and describe and discuss the qualitative and quantitative manipulation of the data. Limitations or problems with the analysis based on the data collection results will also be discussed. This section shall also contain references to accession numbers used for all collections, photographs, and field notes obtained during the study, and the location where they are permanently housed.

m. Investigation Results: This section will describe all the archaeological resources encountered during the study, and any other data pertinent to a complete understanding of the resources within the study area. This section shall include enough empirical data that the study results can be independently assessed. The description of the data shall minimally include: a description of the site; amounts and type of material remains recovered; relation of the site or sites to physiographic features, vegetation and soil types; direct and indirect impacts to the site(s); analysis of the site and data (e.g., site type, cultural historical components and information, cultural/behavioral inferences or patterns); site condition; and location and size information (elevation, complete quad map source, legal description, address if appropriate, and site size, density, depth, and extent). The information shall be presented in a manner that can be used easily and efficiently by the Corps of Engineers.

n. Evaluation and Conclusions: This section should evaluate and formulate conclusions concerning location of the site(s); size, condition, distribution, and density in relation to other sites in the area; and significance in relation to the local and regional prehistory, protohistory, and history. This section shall also discuss the potential and goals for future research; the reliability of the analysis; relate results of the study and analysis to the stated study goals; identify changes, if any, in the research goals; synthesize and compare the results of the analysis and study; integrate ancillary data; and identify and discuss cultural/behavioral patterns and processes that are inferred from the study and analysis results.

o. Recommendations: This section shall discuss the significance of the site(s) in relation to the research goals of the study and the National Register of Historic Places criteria, make recommendations as to the eligibility of the site(s) to the National Register; recommend future intensive testing or mitigative priorities and needs; and make suggestions with regard to the Corps of Engineers planning goals. These recommendations shall include a time and cost estimate for mitigation, if necessary. If it is the Contractor's assessment that the site(s) is (are) not significant, the methods of investigation and reasoning which support that conclusion will be presented. Any evidence of cultural resources or materials which have been previously disturbed or destroyed will be presented and explained.

p. References: This section shall provide standard bibliographic references (American Antiquity format) for every publication cited in the report. References not cited in the report will be listed in a separate "Additional References" section.

q. Appendix: This section shall include the Scope of Work; resumes of all personnel involved; all correspondence derived from the study; all State site forms; all testing and any other pertinent report information referenced in the text as being included in the appendix.

6.03 The location of all sites and other features discussed in the text will be shown on a legibly photocopied USGS map and will be bound into the report. All maps will be labeled with a caption/description, a north arrow, a scale bar, township, range, map size, and dates, and the map source (e.g., the USGS quad name or published source) and will have proper margins.

6.04 Failure to fulfill these report requirements will result in the rejection of the report by the Contracting Officer.

7.00 FORMAT SPECIFICATIONS

7.01 The Contractor shall submit to the Contracting Officer the photographic negatives for all black and white photographs which appear in the final report.

7.02 All text materials will be typed, single-spaced (the draft reports should be space-and-one-half or double-spaced), on good quality bond paper, 8.5 inches by 11.0 inches, with a 1.5-inch binding margin on the left, 1-inch margins on the top and right, and a 1.5-inch margin at the bottom, and will be printed on both sides of the paper.

7.03 Information will be presented in textual, tabular, and graphic forms, whichever are most appropriate, effective, or advantageous to communicate the necessary information.

7.04 All figures and maps must be clear, legible, self-explanatory, and of sufficiently high quality to be readily reproducible by standard xerographic equipment, and will have margins as defined above.

7.05 The final report cover letter shall include a budget of the project.

7.06 The draft and final reports will be divided into easily discernible chapters, with appropriate page separation and heading.

8.00 MATERIALS PROVIDED

8.01 The Contracting Officer will furnish the Contractor with the following materials:

a. Access to any publications, records, maps, or photographs that are on file at the district headquarters.

9.00 SUBMITTALS

9.01 The Contractor will submit reports according to the following schedules:

a. Field Report: The original and one copy of a field report will be submitted after completion of the field work. The field report will summarize the work, project/field limitations, methodology used, time utilized, and survey results.

b. Project Field Notes: One legible copy of all the project field notes will be submitted with the draft contract report.

c. Draft Contract Report: The original and 10 copies of the draft contract report will be submitted on or before days after contract award. The draft contract report will be reviewed by the Corps of Engineers, the State Historic Preservation Officer, the State Archeologist, and the National Park Service. The draft contract report will be submitted according to the report and contract specifications outlined in this Scope of Work.

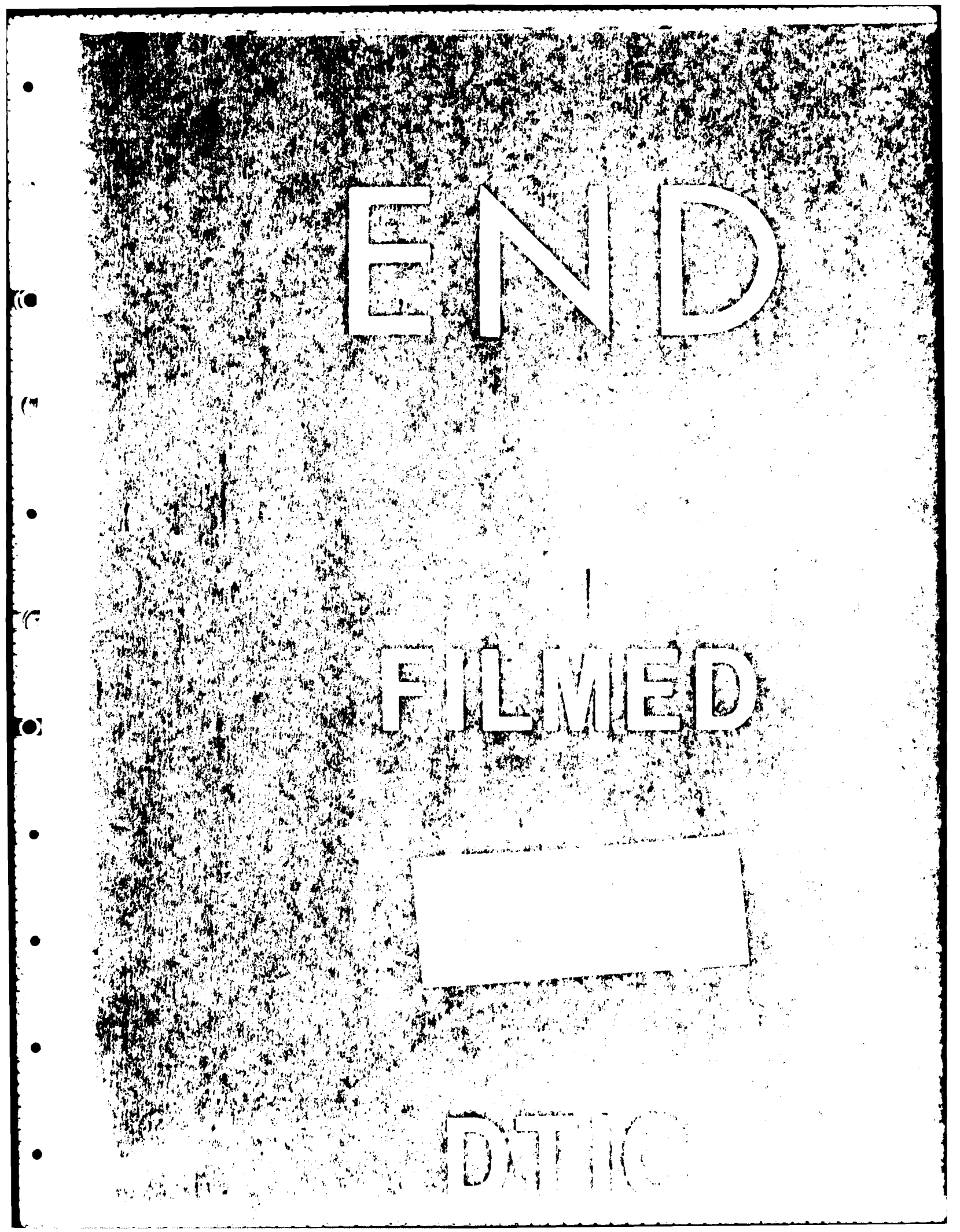
d. Final Contract Report: The original and 15 copies of the final contract report will be submitted days after the Corps of Engineers comments on the draft contract report are received by the Contractor. The final contract report will incorporate all the comments made on the draft contract report.

e. National Register Forms: An original and 1 copy of a completed National Register Nomination Form will be submitted with the final contract report.

9.02 Neither the Contractor nor his representative shall release any sketch, photograph, report, or other material of any nature obtained or prepared under the contract without specific written approval of the Contracting Officer prior to the acceptance of the final report by the Government. After the Contracting Officer has accepted the final report, distribution will not be restricted by either party except that data relating to the specific location of extant sites will be deleted in distributions to the public.

10.00 METHOD OF PAYMENT

10.01 Requests for partial payment under this fixed price contract shall be made monthly on ENG Form 93. A 10 percent retained percentage will be withheld from each partial payment. Upon approval of the final reports by the Contracting Officer, final payment, including previously retained percentage, shall be made.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